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The Cascading of Contrast Effects on Auditors' Judgments in Multiple Client Audit Environments

Sudip Bhattacharjee
Virginia Polytechnic Institute & State University

Mario J. Maletta
Northeastern University

Kimberly K. Moreno
Northeastern University

ABSTRACT: Accounting decisions often involve similar types of judgments regarding different clients, projects, or employees. These tasks may use similar information items and be performed within the same work session. While independent consideration of the information for each respective decision may be desired, psychology research on contrast effects suggests that the information from a previous decision may be retained and compared to the information provided for a current judgment. Such contrast effects are potentially critical to accounting judgments because they suggest that the information associated with a given decision task will be evaluated differently depending on the nature of the prior contextual information. Using a multi-client audit context, we find that auditors are susceptible to contrast effects such that their judgments on a current client are influenced by their exposure to similar judgment information on a prior client. We also extend prior psychology and accounting research by examining and finding that for a current client, the magnitude of the contrast effect from an initial judgment task *cascades* to influence indirectly related subsequent judgment tasks for which no information from the prior client is available for comparison. We also find auditors' documentations of evidence are systematically affected by the contrast and cascading of contrast effects. Thus, our results provide support for contrast effects and, most important, the cascading of contrast effects to subsequent decisions.

Keywords: *multi-client environment; internal audit; context effects; audit checklists.*

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I. INTRODUCTION

Accounting and business decision makers are often required to make similar types of evaluative decisions regarding different clients, projects, and/or employees within relatively short time periods. For example, auditors often work on more than one client at a time and are required to make the same decisions for each. Managers regularly evaluate multiple products concurrently when making resource distribution decisions and often evaluate the performances of multiple employees within single evaluation sessions. Financial analysts may simultaneously evaluate multiple firms from the same industry when determining earnings forecasts. These situations require decision makers to consider significant amounts of similar information across multiple decision targets, often within the same work period or session. While independent consideration of the information for each respective decision may be desired or in some cases required, psychology research on contrast effects suggests that the information from a previous task (i.e., the prior decision) may be compared to the information provided for the current judgment task (Herr 1989; Stapel and Koomen 1998), potentially influencing the decision at hand. In effect, prior judgment tasks from within a particular domain create a prime or a context against which the information from the current or target judgment task may be contrasted (Stapel and Koomen 1998; Wedell et al. 1987).[1]

Contrast effects are potentially critical to accounting judgment processes because they suggest that the information associated with a given decision task will be evaluated differently depending on the nature of the prior contextual information. For example, a financial analyst's evaluation of a company may be more optimistic (pessimistic) depending on whether the prior company was evaluated negatively (positively). Similarly, an auditor's judgment of the internal controls of a current client may be a function of a similar judgment made on a prior client, which could lead to over- or under-reliance on the strength of those controls. Thus, while business decision makers such as accountants may have cumulative norms developed from prior experience against which current information can be compared, they may also use a comparison-based evaluation process that over-utilizes readily available contextual information.

We use a multi-client audit setting to study contrast effects since working on multiple clients is a pervasive reality in audit practice and involves an environment where comparative contextual information is readily available. Specifically, the dramatic increase in workloads and time pressures faced by auditors in the post-Sarbanes-Oxley era and the associated increase in the use of standardized checklists means that auditors make similar audit evaluations using relatively uniform information across multiple clients in a very short time frame. As such, understanding the influence of contrasts effects on auditor decision making is timely and important. The first part of this research examines whether auditors are susceptible to contrast effects in multi-client audit environments such that their judgments on a current client are influenced by their exposure to similar judgments on a prior client.

Of potentially greater importance, this study also examines a critical issue that has received little attention in both prior accounting and psychology research—the cascading of contrast effects from comparisons associated with an initial task to a subsequent, indirectly related decision task where an opportunity for direct comparisons is not immediately available (i.e., no direct comparative information related to the subsequent evaluation task is present). Prior psychology research demonstrating contrast effects (e.g., Highhouse et al. 1996; Stapel and Koomen 1998) has not investigated the potential carryover of such effects from one judgment task to another. Yet, the predisposition of decision makers to use comparative information suggests this possibility exists in accounting and other business decision making areas. For example, assume that a manager is evaluating the performance skills of several employees. It is possible that the manager's evaluation of the first employee's technical skills may affect his/her evaluation of the second employee's technical skills (i.e., a contrast effect for a similar or related judgment), which may, in turn, affect his/her evaluation of the second employee's tacit management skills, an evaluation not performed on the first employee (i.e., a carryover or cascading of contrast effects to an indirectly related judgment). Similarly, an auditor's recent evaluation of the internal audit function of a prior client may affect his/her evaluation of a current client's internal audit function, which may then affect the auditor's evaluation of the current client's receivables or his/her assessment of the obsolescence of the current client's inventory.

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[1] We use the term target and current interchangeably to refer to the current judgment/client at hand.

Research demonstrates that decision makers overwhelmingly prefer to use comparative information when it is available (e.g., Slovic and MacPhillamy 1974; Lipe and Salterio 2000). It suggests that decision makers perform comparisons for evaluative tasks and may do so as a strategy to minimize cognitive effort (Libby et al. 2004). Given the propensity for individuals to perform and rely on comparisons, we argue for evaluative decisions where no immediate comparative information is available, decision makers will incorporate information from the most readily available, related comparison (Brewer 1987). Therefore, we extend prior accounting and psychology literature by not only investigating the potential for contrast effects with similar judgments, but also by investigating whether the magnitude of contrast effects from an initial task will cascade or carryover to influence subsequent, indirectly related decisions, where no comparative information is available.

The interconnectedness of auditing processes makes it a critically unique setting in which to study the cascading of contrast effects. The entire audit process is comprised of sequential tasks where the result of one judgment process is often an input into a subsequent decision process (Hogarth 1991; Rau and Moser 1999). As such, there is a potential for auditors to use comparative information from an initial judgment in a subsequent judgment task, with significant overall implications.

In our study, 52 auditors were randomly divided into three treatment conditions: prior client with a strong internal audit department (strong prior-client group), prior client with a weak internal audit department (weak prior-client group), and no prior client. The strong (weak) prior-client group was provided with information indicative of a strong (weak) internal audit department for the prior client. Auditors in the no-prior-client treatment received no information on the prior client. Auditors in the two prior-client groups were required to evaluate the strength of the internal audit department of the prior client (Prior Company). Thereafter, participants in all three groups were asked to evaluate the strength of the target internal audit department (Target Company). This was followed by an evaluation of the Target Company's inventory to assess the potential obsolescence risk of one of its items and the extent of testing in the inventory area. After each assessment, auditors were required to document the evidence that influenced their assessments. Auditors' susceptibility to contrast effects was examined by comparing the internal audit quality assessment of the target and the prior client. The cascading of contrast effects was evaluated by examining whether the magnitude of the contrast effect (a *comparative difference* measured as the difference between the internal audit quality rating of the target and the prior client) significantly affected an inventory obsolescence judgment (an indirectly related subsequent task).

Our results indicate that auditors are highly susceptible to contrast effects in making internal audit quality assessments. Auditors assessing the internal audit quality of a target client after evaluating a client with a strong internal audit department rated the quality of the target's internal audit department as being significantly lower in quality than when auditors first evaluated a client with a weak internal audit department or no prior client. Consistent with this, the results also show that auditors documented a significantly greater (smaller) number of positive (negative) evidence items when the prior client was negative than when the prior client was positive even though the information being evaluated was for the same ambiguous target client. Of potentially greater importance, the findings of this study also indicate that contrast effects cascade do play a role in subsequent, indirectly related judgment tasks. Specifically, the *comparative difference scores* (i.e., the internal quality assessment for the target client less the assessment for the prior client) were strong enough to affect auditors' inventory obsolescence judgments, even while controlling for the formal internal audit quality assessment for the target client. The more positive (negative) the comparative difference between the target and prior client, the lower (higher) the auditors' assessments of inventory obsolescence risk for the target client.[2] Equally important, the results also provide evidence that contrast effects cascaded to significantly affect the evidence documented by auditors for their inventory obsolescence assessments. The more positive (negative) the auditors' comparative difference, the more positive (negative) the inventory items auditors documented as influencing their obsolescence judgments. Thus, the ramifications of contrast effects early in an accounting decision process may be far reaching, as our results indicate that they systematically affect subsequent audit judgments and auditors' evidence documentation.

The results of this study have implications for prior accounting and decision-making research. In particular, prior studies that have neither incorporated nor controlled for the role of contrast effects may be missing an essential element of the decision environment. For example, financial analysts' buy or sell recommendations may not only be simply based on the merits of the company they are analyzing, but also on the nature of the prior company just analyzed. Similarly, capital budgeting decisions may be impacted by the prior projects evaluated, which could lead to over or under investment in a current project. In the same manner, since managers often conduct performance evaluations of multiple employees at year-end, susceptibly to contrast effects may lead to inaccurate feedback and provide a poor basis for identifying candidates for training and promotion. In effect, our results indicate that accounting research needs to further investigate contexts where individuals make multiple judgments about different targets.[3]

II. THEORY AND HYPOTHESES

Comparison-Based Decision Making in Accounting

Prior research suggests that decision makers will often automatically and unconsciously make judgments in a comparative manner (Hsee 1996, 1998). Essentially, individuals will resort to using information that has a basis for comparison rather than information that cannot be immediately compared. Comparison-based decision making approaches have been demonstrated in accounting. For example, Lipe and Salterio (2000, 297) examined judgment effects within a balanced scorecard scenario and found that M.B.A. students "succumbed to the simplifying strategy of using only common measures in evaluating multiple managers." In essence, they found that even though participants were asked to provide independent evaluations of manager performance (i.e., they were not asked to compare or rank manager performance), comparative processes were utilized such that their evaluative judgments were only based on measures the managers had in common. The unique measures, which had no basis for comparison within the context of the experiment, were not found to have any effect on participants' evaluative judgments. While prior studies indicate that accounting decision makers are prone to comparative-based decision making in a single task setting, research has not addressed the impact of a prior judgment task on a current judgment task in a multi-client environment.

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[2] We define a positive comparative difference as a situation where the current client is evaluated more favorably than the prior client. Similarly, we define a negative comparative difference as a situation where the current client is evaluated more unfavorably than the prior client.

[3] Common information refers to similar information items encountered across multiples tasks.

The Role of Contrast Effects on Decision Making

Prior cognitive research indicates that judgments are influenced by previous experiences such that individuals interpret and ultimately make judgments based on the information from a previous judgment (e.g., Herr 1989; Stapel and Koomen 1998; Wedell et al. 1987). In effect, the context in which a target stimulus is embedded provides an interpretive frame for comparative evaluation (Stapel and Winkielman 1998). Context based effects can result in "assimilations" (i.e., target is rated similar to the context) or "contrasts" (i.e., target is rated different from the context), depending on certain task factors (Foti and Hauenstein 1993). Context information has been found to result in contrast effects when it belongs to the same category as the target issue (Stapel and Koomen 1997, 1998). For example, Stapel and Koomen (1997) found that when evaluating an ambiguous target *person*, contrast effects occurred when participants were primed with a friendly or hostile *person* exemplar and assimilation effects occurred when participants were primed with a friendly or hostile *non-person* exemplar. In addition, Canan and Knight (1996) found that contrast effects occurred when participants were required to explicitly rate previous exemplars, while assimilation resulted when previous exemplars were not formally rated. This suggests that, when possible, individuals will utilize a comparative judgment process when interpreting a target stimulus. More importantly, it suggests that the same target stimulus can be evaluated differently depending on the context in which it is judged. In accounting contexts, decision makers often make explicit, successive evaluative judgments that are similar in nature, the conditions that lead to contrast effects. Therefore, the current study focuses on the role of contrast effects in accounting decision making.

The role of contrast effects has been demonstrated in social cognition and social judgment research (e.g., Higgins 1996; Manis et al. 1988), marketing research (e.g., Rashmi and Monroe 2002) and research in strategic decision making (Highhouse et al. 1996; Stapel and Koomen 1998). For example, in a strategic decision making context, Highhouse et al. (1996) found that participants differentially rated the threats associated with an ambiguous strategic decision depending on whether they were initially exposed to a business opportunity or a business threat. Similarly, Adaval and Monroe (2002) found that participants judged a consumer product as less expensive when placed in a high-priced context versus a low-priced context. Research also suggests that decision makers may not be consciously aware that prior contexts are influencing current judgments (e.g., Herr 1989). Rather, decision makers may use the prior context as a standard of comparison without awareness. Thus, decision makers in psychology and other applied domains may be unaware that their decisions are susceptible to contrast effects.

The audit context provides an ideal setting to study such contrast effects. Due to the recent regulatory changes, auditors are expected to make back-to-back judgments using common information across clients. For example, auditors make similar decisions across multiple clients within the same industry using mechanisms such as uniform checklists. In addition, given the standardized audit methodologies, the judgments made across audit clients are very similar. These conditions are likely to lead to a contrast effect such that if a prior judgment is unfavorable (favorable) then a later judgment would be more favorable (unfavorable).

Based on prior contrast effect research, this suggests that audit judgments for a particular client may be based on characteristics of prior clients addressed by the auditor. Psychology research suggests that more recently used primes are more accessible for use than less recently used primes (Fiske and Taylor 1991; Wyer and Srull 1986). Therefore, we argue that auditors will use the most recent prior client as a context to their current judgment since this prime will be the most salient. Even though auditors have an accumulation of experiences, they either may subconsciously or consciously resort to a comparison-based evaluation process that utilizes readily available contextual information (i.e., information retained from a recently reviewed prior client). To examine the susceptibility of auditors to such contrast effects, the following hypothesis will be investigated.

> **H1:** Auditors will be susceptible to contrast effects in a multi-client audit setting such that their judgments for a target client will be influenced by similar judgments made for a prior client.

Cascading of Contrast Effects

Several types of accounting decisions involve making an initial judgment followed by an indirectly related subsequent judgment. If the initial judgment is influenced by contrast effects (i.e., H1), then an important empirical question is whether these effects will carryover to subsequent judgment tasks. Consider that employee performance is often evaluated on several dimensions such as technical knowledge and tacit managerial knowledge (i.e., leadership attributes such as management of self, others, and career [Wagner and Sternberg 1986]). If a first employee is evaluated only on his/her technical knowledge and a second is evaluated on his/her technical and managerial knowledge, then carryover contrast effects have the potential to occur. Specifically, the evaluation of the technical skills of the second employee (the target) may be affected by comparing his/her skills to those of the previous employee to create contrast effects. In the subsequent evaluation of the target employee's tacit managerial skills, the potential exists for the contrast effect from the first decision to be used as an information cue.

As previously noted, research in various domains has demonstrated that decision makers use comparative information when it is available, as a way to minimize cognitive effort (Libby et al. 2004; Payne et al. 1993; Slovic and MacPhillamy 1974). This suggests that in an interconnected decision-making environment, individuals may, in their desire to make sense of information through the use of comparisons, use the results of a comparison from an initial judgment in a subsequent judgment task where no comparative information is available.

The audit process is comprised of a set of sequential tasks. For example, Rau and Moser (1999) provide evidence on how the interconnected nature of the audit process can cause tasks from one stage of an audit to have an impact on tasks in a subsequent stage. In particular, they found that personally performing an audit task in the testing phase (either explaining an increase in finished goods inventory or an increase in long-term notes payable) impacted auditors' subsequent going-concern judgments. Audit seniors who personally performed a task at an earlier stage of the audit for which the underlying facts reflected positively (negatively) on the client's going-concern ability, subsequently made more positive (negative) going-concern judgments. Memory tests indicated that the nature of the prior task had affected auditors' memories for client information. Similarly, O'Donnell and

Schultz (2005) found that the holistic perspective acquired when making overall strategic risk assessments influenced auditors' subsequent account-level risk assessments. These results were found despite an experimental design where the holistic opinions had virtually no direct implication for the more detailed account-level evidence. The authors suggest that the perspective acquired during the overall strategic risk assessments altered auditors' tolerances for inconsistent fluctuations in the account-level evidence.

These two studies suggest that prior tasks can affect an auditor's ability to process information for a subsequent task on the same audit. A similar task effect is at work with respect to the cascading of contrast effects where comparative information is carried-over from a prior client. More specifically, given the propensity of individuals to perform comparisons, in the absence of information that can be used for this purpose, decision makers will incorporate the most readily available comparison as an information cue for a subsequent task, even though it is not directly related (i.e., the subsequent task is indirectly related to the prior task). In effect, since no information is available against which to make direct comparisons in performing the subsequent task, the results of the previously performed comparison will be used in an attempt to either consciously or unconsciously minimize cognitive effort.[4]

We expect that the comparative difference between the assessments of the target and that of the prior client is part of the context within which a subsequent, indirectly related task for the target will be performed. Accordingly, for the judgment that is rendered for the subsequent task, the more positive (negative) the outcome of the comparison between the target and the prior client, the more likely a positive (negative) evaluation will be made of the subsequent task information. Since the comparative difference measure captures the strength of contrast effects, it allows us to investigate the influence of contrast effects on subsequent, indirectly related judgments. The following hypothesis is proposed.

> **H2:** There will be a cascading of contrast effects in a multi-client audit setting such that the magnitude of the contrast effect will impact a subsequent, indirectly related audit task.

III. METHOD

Participants

Fifty-three auditors with an average of 4.68 years experience (SD = 4.49) with Big 4 accounting firms participated in the experiment. Participants consisted of 9 staff auditors (17.0 percent), 33 seniors (62.3 percent), 6 managers (11.3 percent), and 5 partners (9.4 percent). Since the majority of the participants were at the rank of audit senior and above, these auditors would be familiar with various audit-planning decisions made in this study (Abdolmohammadi 1999). Eleven additional auditors participated in pretesting the research instrument (4 partners, 1 senior manager, and 6 seniors).

Overview of the Study

Auditors were randomly divided into three treatments: prior client with a strong internal audit department (strong prior-client group); prior client with a weak internal audit department (weak prior-client group); and no prior client. The strong (weak) prior-client group was provided with information indicative of a strong (weak) internal department for the prior client. Auditors in the no-prior-client treatment received no information on the prior client. Auditors in the two prior-client groups were required to evaluate the strength of the internal audit department of the prior client (Prior Company). Thereafter, participants in all three groups were asked to evaluate the strength of the target internal audit department (Target Company). This task was directly related to the task performed on the prior client. This was followed by an evaluation of the Target Company's inventory (i.e., a task indirectly related to the task performed on the prior client) to assess the potential obsolescence risk of one of its items and the extent of testing in the inventory area.[5]

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[4] While auditing standards require that some tasks be conducted on every audit (e.g., internal audit assessment), certain audit tasks are only conducted on some audits depending on the nature of the client and industry (e.g., inventory obsolescence judgment). Therefore, this leads to conditions where comparative information from a prior client may be available on certain audit tasks while not for others.

Experimental Materials and Procedures

Assessment of Prior Client's Internal Audit Department

Auditors in the prior-client groups read background information on the Prior Company and a summary of nonaudited financial information for the year. The information indicated that the audit of the client was at the planning stage and documentation of the internal control procedures had been prepared, but no compliance testing had been made. In addition, participants were told that the company had made no significant accounting policy changes, or reported any extraordinary items or other unusual non-operating activities over the last three years.

Thereafter, auditors in the prior-client groups were given information on the internal audit department of the Prior Company to consider for audit planning. The information items were selected from a survey by Felix et al. (1998), which had reported the factors used by external auditors to evaluate the strength of internal audit staff. In total, auditors were given information on 11 factors. These factors were examined by two Big 4 audit partners who verified that the information was the type that external auditors typically use to evaluate a client's internal audit department. The information included items such as the percentage of internal auditors that passed the CPA exam, the time internal auditors spend on financial statement reporting activities versus operational efficiency, and the turnover level in the company's internal audit department.

In the weak prior-client group, all the information on the internal audit department indicated that the client had a weak internal audit staff. In the strong prior-client group, the same information indicated that the client had a strong internal audit staff. For example, auditors in the weak prior-client group were told that 30 percent of the internal auditors have passed the CPA exam, while auditors in the strong prior-client group were told that 90 percent of the internal auditors have passed the CPA exam. We conducted pretests to verify that the information would be perceived as strong or weak by the two groups.[6] After reading information on the internal audit department, the auditors provided their assessment of the overall level of quality of the Prior Company's internal audit department (0 = Very Low to 100 = Very High). Finally, auditors also rated the extent to which they would be willing to use the Prior Company's internal audit in the performance of the external financial statement audit (0 = No Use of Internal Audit to 100 = Very High Level of Use).

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[5] A different group of 14 auditors from across professional ranks reviewed our experimental materials for realism. When asked whether our task setting (working on two different clients in a single work session) was realistic (0 = Very Unrealistic; 10 = Very Realistic), auditors gave an average rating of 9.29 (SD = 1.20). These auditors also thought that it was realistic to work on multiple clients back to back with little time elapsed between them (mean = 9.28, SD = 1.26). Auditors frequently work on multiple clients in a single, relatively uninterrupted work period (mean = 8.29, SD = 1.43 [0 = Not Very Frequently; 10 = Very Frequently]). Auditors rated it significantly more likely that they would work on two clients in a single work session (mean = 7.79, SD = 1.80 [0 = Not Very Often; 10 = Very Often]) than a single client (mean = 3.64, SD = 2.23), three clients (mean = 5.86, SD = 2.07), and four or more clients (mean = 3.71, SD = 2.46 [all p's < 0.001]). In addition, auditors rated their percentage of time spent addressing issues on two clients during a single work session (mean = 40.71, SD = 14.25) significantly higher than a single client (mean = 24.42, SD = 17.21, $p = 0.034$), three clients (mean = 25.50, SD = 16.25, $p = 0.038$) and four or more clients (mean = 9.35, SD = 7.20, $p < 0.001$). These results provide evidence that auditors work on back-to-back clients within a short, relatively uninterrupted work period, supporting the relevance of contrast effects in the audit environment and the realism of our case materials.

Assessment of the Target Client's Internal Audit Department

Auditors in all groups then read information on a different client (Target Company) including general background information and a summary of nonaudited financial information for the year. They were subsequently given 11 information items on the internal audit department of the Target Company. The information cues were the same as those provided to auditors in the prior-client groups when evaluating the internal audit of the Prior Company. However, the information on the internal audit department of the Target Company indicated that the client had a moderately strong internal audit staff.[7] Of the 11 items, two of the items were indicative of a weak internal audit department, while two of the items indicated a strong internal audit department. The remaining seven items were moderate in nature. We used a moderate scenario for the target client since prior psychology research indicates that contrast effects are most salient in ambiguous situations (Fiske and Taylor 1991; Herr et al. 1983). In addition, prior audit research suggests that ambiguous decision contexts may be of most interest to audit practice since these are the conditions that may lead to audit inefficiency and/or ineffectiveness (Salterio and Koonce 1997; Hackenbrack and Nelson 1996; Braun 2001). After reading information on the internal audit department, the auditors provided their assessment of the overall level of quality of the Target Company's internal audit department (0 = Very Low to 100 = Very High) and the extent to which they would be willing to use the Target Company's internal audit department (0 = No Use of Internal Audit to 100 = Very High Level of Use) in the performance of the external audit. After providing their internal audit ratings, auditors were asked to document the evidence items that most significantly influenced these internal audit judgments.

Assessment of the Target Client's Inventory

Following the internal audit assessment, auditors were asked to perform a preliminary obsolescence risk assessment of the Target Company's inventory. Given the salience of contrast effects in ambiguous situations (Fiske and Taylor 1991; Herr et al. 1983), we used an inventory task that both supported and discounted the existence of inventory obsolescence. Auditors were told that during the audit of last year's financial statements, emphasis was placed on evaluating the potential obsolescence of the Target Company's largest selling product. Further, they were told that the client's competition was in the process of producing and marketing a technologically superior product that could make the client's product obsolete. Thereafter, participants received additional information in the form of an audit memo that they were told had been compiled by a member of their audit team. The audit memo contained detailed information that both supported and refuted the existence of inventory obsolescence in the target year. The information covered the technology, production, and marketing aspects of the inventory in question. For example, while the information indicated that the competition had developed a technologically superior product that would be sold at a lower price than the client's product (supporting inventory obsolescence), it was also noted that the client had an international market in which it could sell the inventory and the competition's product would not be available for 8–20 months (refuting inventory obsolescence).[8] In addition to the inventory obsolescence information, the audit memo told all participants that the client's preference was for no write-down of inventory and no disclosure of the inventory issue. After reading the audit memo, participants were asked to indicate the likelihood that the Target Company may have an obsolescence problem (0 = Very Unlikely to 100 = Very Likely). In addition, participants provided an assessment of the extent of audit testing that was required in this area (0 = Limited Audit Testing to 100 = Extensive Audit Testing). Auditors were again asked to document the evidence items that most significantly influenced their judgments.

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[6] The strong and weak versions of the internal audit cues were pretested using 18 senior auditing students. Based on the cues, participants were asked to rate the quality of the client's internal audit department on a 100-point scale. The results indicated that participants given the strong version of the instrument evaluated the level of quality of the client's internal audit department to be significantly higher than participants given the weak version of the instrument (mean = 81.11 versus mean = 25.55, respectively; $t = 11.39$, $p < 0.001$).

[7] Ten additional senior auditing students were used to pretest the moderate version of the internal audit information. Results indicated that participants given the moderate version of the instrument rated it significantly higher (mean = 65.00) than the weak version of the instrument pretested earlier (mean = 25.55), and significantly lower than the strong version of the instrument (mean = 81.11, p-values < 0.001).

The final case materials were mailed to a contact partner at each firm. Each partner received a randomized set of instruments and was responsible for disseminating and collecting the instruments. The final instrument consisted of the task instructions, internal audit assessment for the prior-client groups (Prior Company), internal audit assessment of the target client (Target Company), the inventory obsolescence task (Target Company), and some post-experimental demographic questions. The demographic questions addressed years of audit experience, rank, and the years of experience in auditing manufacturing clients.

IV. RESULTS

Prior to the main results, we present data on auditors' assessments of the prior client's internal audit quality and correlations between the variables used in our analyses. The internal audit quality assessments indicate that auditors in the strong prior-client group rated the prior client's internal audit quality statistically higher than the weak prior-client group, confirming the success of our manipulation (mean = 77.50, SD = 19.42 versus mean = 30.26, SD = 9.05, $p < 0.001$). Table 1 presents a correlation matrix containing all the variables used in the statistical analyses performed to test H1 and H2.

Hypothesis 1: Auditor Susceptibility to Contrast Effects

The first hypothesis examines whether auditors are susceptible to contrast effects in multi-client settings such that their assessments of internal audit quality for a target client will be a function of a comparison between the internal auditors of the target and a prior client. To test this hypothesis, an ANCOVA was performed with auditors' internal audit quality assessments for the target client (Target Company) specified as the dependent variable (*TARGET-IA QUALITY*). The main independent variable was prior condition

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[8] The inventory obsolescence task had been used in prior research and was modified for the present study (see Anderson et al. 1997; Moreno and Bhattacharjee 2003). In addition, two partners, one senior manager, and six seniors pretested the inventory task. The pretest indicated that the information provided was realistic and typical of inventory information that auditors encounter during an audit. They also confirmed that the inventory task contained information that both supported and discounted the existence of inventory obsolescence.

TABLE 1
Correlation Matrix

	TARGET-IA QUALITY	*COMP-DIFF*	*TARGET-INVENTORY RISK*	*TARGET-INVENTORY TESTING*	*PRIOR-IA QUALITY*	*MFG. EXP*
TARGET-IA QUALITY	1.000					
COMP-DIFF	**0.834**	1.000				
TARGET-INVENTORY RISK	−0.219	−0.299	1.000			
TARGET-INVENTORY TESTING	0.066	0.055	**0.357**	1.000		
PRIOR-IA QUALITY	**−0.602**	**−0.943**	**0.319**	0.023	1.000	
MFG. EXP	**−0.280**	−0.194	−0.049	−0.197	0.168	1.000

Bolded cells: Correlation is statistically significant at the 0.05 level (two-tailed).

TARGET-IA QUALITY = auditor assessment of overall internal audit quality of the Target Company, which ranges from 0 (very low) to 100 (very high);
COMP-DIFF = *TARGET-IA QUALITY* minus *PRIOR-IA QUALITY*;
TARGET-INVENTORY RISK = auditor assessment of risk of inventory obsolescence for the Target Company; scores range from 0 (very unlikely) to 100 (very likely);
TARGET-INVENTORY TESTING = auditor assessment of the extent of audit testing required for the inventory area for the Target Company; scores range from 0 (limited testing) to 100 (extensive testing);
PRIOR-IA QUALITY = auditor assessment of overall internal audit quality of the Prior Company, which ranges from 0 (very low) to 100 (very high); and
MFG. EXP = number of years of auditor manufacturing experience.

(*PRIOR-IA GROUP*) at three levels: strong prior client, weak prior client, and no prior client. The number of years of auditor manufacturing experience (*MFG. EXP*) and the auditor's *RANK* (1 = staff, 2 = senior, 3 = manager, 4 = partner) were specified as covariates.

Based on our hypothesis, contrast effects would be demonstrated if there is a significant main effect for *PRIOR-IA GROUP* in the ANCOVA. Consistent with this expectation, the results (see Panel A of Table 2) indicate that *PRIOR-IA GROUP* is statistically significant at the $p < 0.001$ level. The results of comparisons presented in Panel B of Table 2 indicate that the internal audit quality assessment ratings of the target client for auditors in the strong prior client internal audit group (mean = 47.50) are significantly lower than the weak prior client internal audit group (mean = 71.05; $t = -5.796$; $p < 0.001$). This provides strong support for the role of contrast effects since auditors' assessments of the same Target Company's internal audit quality information is significantly lower when exposed to a prior strong client than when exposed to a prior weak client. In addition, Panel B of Table 2 indicates that the mean *TARGET-IA QUALITY* rating of the strong prior-client group (mean = 47.50) was significantly lower that the mean rating of the no-prior-client group (mean = 57.19; $t = -2.083$; $p < 0.023$), while the mean *TARGET-IA QUALITY* rating of the weak prior-client group (mean = 71.05) was significantly higher that the mean rating of the no-prior-client group (mean= 57.19; $t = -3.201$; $p < 0.003$). The comparisons with the control group clearly demonstrate that the observed contrast

TABLE 2
ANCOVA Results for Hypothesis 1

Panel A: Analysis of Covariance for Judgments of Target Internal Audit Quality

Source of Variation	SS	df	F-Ratio	p-value
PRIOR IA GROUP	4624.07	2	15.235	0.001
Covariates:				
MFG. EXP	142.24	1	0.937	0.338
RANK	425.42	1	2.803	0.101

Panel B: Relevant Means (Standard Deviation) and Comparisons

Variable	Strong Prior Client (n = 17)	Weak Prior Client (n = 19)	No Prior (n = 16)
PRIOR-IA QUALITY	77.50	30.26	
	(19.42)	(9.05)	
TARGET-IA QUALITY	47.50	71.05	57.19
	(13.09)	(11.62)	(14.02)

Comparisons	df	t-statistic	p-value (one-tailed)
Strong Prior Client versus Weak Prior Client	35	−5.796	0.001
Strong Prior Client versus No Prior	32	−2.083	0.023
Weak Prior Client versus No Prior	33	3.201	0.002

TARGET-IA QUALITY = auditor assessment of overall internal audit quality of the Target Company, which ranges from 0 (very low) to 100 (very high);
PRIOR IA GROUP = prior condition (1 = prior client has strong internal audit department, 2 = no prior client provided, 3 = prior client has weak internal audit department);
MFG. EXP = number of years of auditor manufacturing experience;
RANK = auditor rank within firm (1 = staff, 2 = senior, 3 = manager, 4 = partner); and
PRIOR-IA QUALITY = auditor assessment of overall internal audit quality of the Prior Company, which ranges from 0 (very low) to 100 (very high).

effects are driven by both the prior strong and the prior weak conditions since the control group's target internal audit quality rating was significantly different from both the prior-client groups.

A second test of H1 was performed with auditors' actual assessments of the internal audit quality of the Prior Company (*PRIOR-IA QUALITY*) specified as the main independent variable instead of the categorical variable *PRIOR-IA GROUP* tested in the ANCOVA. This variable captures each auditor's actual perception of the quality of the Prior Company's internal audit department and thus, is a finer test of contrast effects. *MFG. EXP* and *RANK* were also included as control variables. Support for H1 would be evidenced by a negative coefficient for *PRIOR-IA QUALITY*, indicating that auditors' assessments of the Target Company's internal audit quality are inversely affected by the quality of the Prior Company's internal auditors. In effect, the higher the auditor's assessment of the internal audit department for the Prior Company, the lower will be their assessment of the quality of the internal audit department for the Target Company. Consistent with H1, the results (see Table 3) indicate that *PRIOR-IA QUALITY* is statistically significant at the $p < 0.001$ level with

TABLE 3
Regression Results for Hypothesis 1

Model: $TARGET\text{-}IA\ QUALITY = \beta_0 + \beta_1 PRIOR\text{-}IA\ QUALITY + \beta_2 MFG.\ EXP + \beta_3 RANK + \varepsilon$

Variables	Hypothesis	Expected Sign	β	Std. Error	t-value	Sig.	VIF
CONSTANT			84.697	8.370	10.119	0.001	
PRIOR-IA QUALITY	H1	–	−0.352	0.085	−4.170	0.001*	1.033
MFG. EXP			−0.192	0.855	−0.224	0.824	1.324
RANK			−2.841	4.153	−0.684	0.499	1.310

Model:
$R^2 = 0.379$ Adjusted $R^2 = 0.322$
F-Ratio = 6.70 Signif. $F < 0.001$

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* Hypothesized factor statistically significant at the $p \leq 0.05$ level.

TARGET-IA QUALITY = auditor assessment of overall internal audit quality of the Target Company, which ranges from 0 (very low) to 100 (very high);
PRIOR-IA QUALITY = auditor assessment of overall internal audit quality of the Prior Company, which ranges from 0 (very low) to 100 (very high);
MFG. EXP = number of years of auditor manufacturing experience; and
RANK = auditor rank within firm (1 = staff, 2 = senior, 3 = manager, 4 = partner).

a negative coefficient (−0.352). Thus, H1 is highly supported across all of our analyses, strongly indicating that auditors are susceptible to contrast effects.[9]

Hypothesis 2: Cascading of Contrast Effects to Indirectly Related Judgments

Hypothesis 2 addresses whether there will be a cascading of contrast effects in a multiclient audit setting such that the magnitude of the comparative difference from one task will impact a subsequent, indirectly related task. This hypothesis is tested by examining whether auditors' subsequent assessments of the risk of inventory obsolescence for the Target Company is also a function of the magnitude of contrast effects that result from the internal audit quality evaluation for the Target Company such that, the more positive (negative) the comparative difference between the Target Company and the Prior Company, the lower (higher) the risk of inventory obsolescence determined by the auditor. To examine this hypothesis, a regression analysis was performed with auditors' assessments of the inventory obsolescence risk for the Target Company (*TARGET-INVENTORY RISK*) as the dependent variable and the comparative difference measure (*COMP-DIFF*) as the main independent variable. *COMP-DIFF* was calculated by subtracting each auditor's actual assessment of the internal audit quality of the Prior Company (*PRIOR-IA QUALITY*) from their assessment for the Target Company (*TARGET-IA QUALITY*). Auditors' assessments of internal audit quality for the Target Company were included as a control variable in the analysis along with *MFG. EXP* and *RANK*. Support for H2 would be evidenced by a significant and negative coefficient for the *COMP-DIFF* variable.

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[9] A test of H1 was also performed using auditors' decisions to utilize internal auditors in the performance of the financial statement audit. A regression analysis was performed with auditors' decisions to utilize the Target Company's internal audit department as the dependent variable (*TARGET-IA-USAGE*) and their decisions to utilize the Prior Company's internal audit department (*PRIOR-IA-USAGE*) as the main independent variable. *MFG. EXP* and *RANK* were also included as control variables. Consistent with H1 and the results regarding auditors' internal audit evaluations, the coefficient for *PRIOR-IA-USAGE* was negative and significant at the $p < 0.01$ level. The means (standard deviations) of *TARGET-IA USAGE* for auditors in the strong prior client group, weak prior client group, and no-prior-client group are 33.05 (11.77), 58.79 (19.52), and 41.44 (16.61), respectively.

Consistent with H2, the results (see Table 4) indicate that *COMP-DIFF* is statistically significant ($p < 0.037$) and negative (-0.219) indicating that auditors' internal audit comparative differences affected their decisions regarding the Target Company's risk of inventory obsolescence. In particular, the more auditors perceived the Target Company's internal audit department to be better than the Prior Company's, the less they assessed the Target Company's risk of inventory obsolescence. Interestingly, *TARGET-IA QUALITY* is only statistically significant at the $p = 0.20$ level, suggesting that auditors' formal internal audit quality assessments do not greatly affect their subsequent decisions regarding the risk of inventory obsolescence. Instead, the results indicate that the comparative difference had more of an effect on the subsequent decision process than the actual metric from the evaluation.[10]

TABLE 4
Regression Results for Hypothesis 2

Model: $$TARGET\text{-}INVENTORY\ RISK = \beta_0 + \beta_1 COMP\text{-}DIFF + \beta_2 TARGET\text{-}IA\ QUALITY + \beta_3 MFG.\ EXP + \beta_4 RANK + \varepsilon$$

Variables	Hypothesis	Expected Sign	β	Std. Error	t-value	Sig.	VIF
CONSTANT			35.874	19.266	1.862	0.072	
COMP-DIFF	H2	–	−0.219	0.119	−1.846	0.037*	3.307
TARGET-IA QUALITY		–	0.241	0.284	0.849	0.202	3.322
MFG. EXP			−2.337	0.973	−2.403	0.022	1.326
RANK			10.381	4.753	2.184	0.036	1.329

Model:
$R^2 = 0.267$ Adjusted $R^2 = 0.176$
F-Ratio = 2.918 Signif. $F < 0.036$

* Hypothesized factor statistically significant at the $p \leq 0.05$ level.

TARGET-INVENTORY RISK = auditor assessment of risk of inventory obsolescence for the Target Company, which ranges from 0 (very unlikely) to 100 (very likely);
COMP-DIFF = *TARGET-IA QUALITY* minus *PRIOR-IA QUALITY*;
TARGET-IA QUALITY = auditor assessment of overall internal audit quality of the Target Company, which ranges from 0 (very low) to 100 (very high);
MFG. EXP = number of years of auditor manufacturing experience; and
RANK = auditor rank within firm (1 = staff, 2 = senior, 3 = manager, 4 = partner).

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[10] The analysis presented in Table 4 was also performed excluding the *COMP-DIFF* variable but still including *TARGET-IA QUALITY*. Consistent with the original regression, *TARGET-IA QUALITY* was not significant at conventional levels. An analysis was also performed which included the *COMP-DIFF* variable and excluded *TARGET-IA QUALITY*. Also consistent with the original analysis, *COMP-DIFF* was still significant at the $p < 0.05$ level. Finally, as a sensitivity test all analyses involving *COMP-DIFF* were run with *COMP-DIFF* computed as a percentage difference and the results were the same as those reported in the paper.

In addition, a regression analysis was performed to determine whether auditors' assessments of inventory obsolescence would translate into differences in the actual amount of inventory testing planned by the auditors for the Target Company. *TARGET-INVENTORY TESTING*, the level of audit testing planned in the inventory area for the Target Company, was specified as the dependent variable (0 = limited testing to 100 = extensive testing), with the risk of inventory obsolescence (*TARGET-INVENTORY RISK*), the extent of internal audit usage on the audit (*TARGET-IA USAGE*), and *COMP-DIFF* as independent variables. *MFG. EXP* and *RANK* were also included as control variables. A significant *COMP-DIFF* variable would indicate a direct influence of the cascading of contrast effects on planned inventory testing. However, the significance of only the *TARGET-INVENTORY RISK* variable would indicate an indirect effect of contrast effects on such decisions. The results (see Table 5) indicate that *TARGET-INVENTORY RISK* is statistically significant ($p < 0.018$) with a positive coefficient (0.381), while *COMP-DIFF* is not statistically significant. Thus, auditors' assessments of the risk of inventory obsolescence are significantly affected by auditors' susceptibilities to contrast effects, which in turn, significantly affect auditors' planning decisions. These findings suggest that the impact of the comparative difference on planned testing is indirect through its effect on inventory risk. This finding is important because it further highlights the overall ramifications of contrast effects on the interconnected decision making processes faced by auditors.[11]

The Role of Contrast Effects on Auditors' Evidence Documentation

After each task, auditors listed the evidence items they considered when arriving at their decisions. Examining the evidence items can provide an indication of whether contrast effects also impact auditors' documentation of audit evidence. We examined the evidence items that auditors documented after their internal audit and inventory judgments for the target client, respectively. For the internal audit judgment, two items were unambiguously indicative of a weak internal audit department, while two items unambiguously indicated a strong internal audit department. Two of the researchers independently reviewed the items documented by the auditors to determine the number of these positive and negative factors listed. We then came up with a composite measure by subtracting the number of negative items listed by each auditor (0,1 or 2) from the number of positive listed (0,1 or 2). The higher the value of the composite measure, the more positive items and less negative items the auditors documented as influencing their judgments. This composite measure was used to examine the impact that comparative differences had on the items auditors' documented as significantly influencing their judgments.

The results of a regression using the auditors' composite scores (*NET UNAMBIG IA ITEMS*) as the dependent variable and *COMP-DIFF* as an independent variable are presented in Panel A of Table 6. They reveal that *COMP-DIFF* is statistically significant ($p < 0.001$) and positive (0.028), indicating that the more positive the comparative difference between the Target Company and the Prior Company, the more positive items and less negative items the auditors documented as influencing their judgments.

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[11] The means (standard deviations) of *TARGET-INVENTORY RISK* for auditors in the strong prior client group, weak prior client group, and no-prior-client group are 63.88 (20.40), 57.11(14.17), and 58.75 (22.99), respectively. The means (standard deviations) of *TARGET-INVENTORY TESTING* for auditors in the strong prior client group, weak prior client group, and no-prior-client group are 76.94 (16.37), 73.95 (13.50), and 70.00 (13.78), respectively. In addition, while *MFG. EXP* and *RANK* were significant, it must be noted that our results do not indicate differences in cascading effects by *MFG. EXP* or *RANK* since the interaction variables (not reported) are not significant.

TABLE 5
Regression Results for Audit Testing

Model: $$\mathit{TARGET\text{-}INVENTORY\ TESTING} = \beta_0 + \beta_1 \mathit{TARGET\text{-}INVENTORY\ RISK} + \beta_2 \mathit{TARGET\text{-}IA\ USAGE} + \beta_3 \mathit{COMP\text{-}DIFF} + \beta_4 \mathit{MFG.\ EXP} + \beta_5 \mathit{RANK} + \varepsilon$$

Variables	**Hypothesis**	**Expected Sign**	**β**	**Std. Error**	**t-value**	**Sig.**	**VIF**
CONSTANT			34.975	14.401	2.429	0.021	
TARGET-INVENTORY RISK		+	0.381	0.152	2.505	0.018*	1.372
TARGET-IA USAGE			0.192	0.177	1.082	0.288	2.572
COMP-DIFF			0.014	0.086	0.161	0.873	2.387
MFG. EXP			0.177	0.910	0.194	0.847	1.576
RANK			3.956	4.589	0.862	0.395	1.684

Model:
$R^2 = 0.267$ Adjusted $R^2 = 0.149$
F-Ratio = 2.261 Signif. $F < 0.07$

* Factor statistically significant at the $p \leq 0.05$ level.

TARGET-INVENTORY TESTING = auditor assessment of the extent of audit testing required for the inventory area for the Target Company; scores range from 0 (limited testing) to 100 (extensive testing);
TARGET-INVENTORY RISK = auditor assessment of risk of inventory obsolescence for the Target company, which ranges from 0 (very unlikely) to 100 (very likely);
TARGET-IA USAGE = auditor assessment of overall willingness to use internal auditors of the Target Company on the financial statement audit; scores range from 0 (very low) to 100 (very high);
COMP-DIFF = *TARGET-IA QUALITY* minus *PRIOR-IA QUALITY*;
MFG. EXP = number of years of auditor manufacturing experience; and
RANK = auditor rank within firm (1 = staff, 2 = senior, 3 = manager, 4 = partner).

To gain more insight into these results, we also examined the percentage of negative and positive items documented by the strong prior client internal audit group and weak prior client internal audit group. The percentage of negative (positive) items documented by auditors in the strong prior client internal audit group was 86.67 percent (13.33 percent) versus 18.5 percent (81.50 percent) by the weak prior client internal audit group ($\chi^2 = 26.60$, $p < 0.001$).[12] These results suggest that the nature of the prior client impacted the types of items that auditors documented as affecting their judgments.

Recall that the remaining seven internal audit items were moderate in nature. We examined whether auditors interpreted and documented any of the seven moderate internal audit cues as though they indicated a strong or weak internal audit department. This was done to investigate whether contrast effects impacted auditors' interpretations of ambiguous internal audit information items. Two of the researchers independently reviewed the factors listed by the auditors to see if they documented any of the moderate cues as negative or

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[12] As might be expected, auditors in the no-prior-client group documented the same percentage of positive (41.67 percent) and negative (58.33 percent) items ($p > 0.05$).

TABLE 6
Regression Results for Evidence Items Documented

Variables	Hypothesis	Expected Sign	β	Std. Error	t-value	Sig.	VIF
Panel A: Items Documented When Evaluating Target Internal Audit Quality							
Model: $NET\ UNAMBIG\ IA\ ITEMS = \beta_0 + \beta_1 COMP\text{-}DIFF + \beta_2 MFG.\ EXP + \beta_4 RANK + \varepsilon$							
CONSTANT			−1.232	0.443	−2.782	0.009	
COMP-DIFF		+	0.028	0.003	8.416	0.001*	1.049
MFG. EXP			−0.048	0.049	−0.983	0.333	1.326
RANK			0.558	0.239	2.337	0.026	1.318
Model: $R^2 = 0.696$ F-Ratio = 25.128	Adjusted $R^2 = 0.668$ Signif. $F < 0.001$						
Model: $NET\ AMBIG\ IA\ ITEMS = \beta_0 + \beta_1 COMP\text{-}DIFF + \beta_2 MFG.\ EXP + \beta_4 RANK + \varepsilon$							
CONSTANT			−0.048	0.756	−0.064	0.949	
COMP-DIFF		+	0.022	0.006	3.750	0.001*	1.049
MFG. EXP			0.050	0.084	0.596	0.555	1.326
RANK			−0.142	0.408	−0.348	0.730	1.318
Model: $R^2 = 0.307$ F-Ratio = 4.881	Adjusted $R^2 = 0.244$ Signif. $F < 0.006$						
Panel B: Items Documented When Evaluating Target Inventory Risk							
Model: $NET\ INVENTORY\ ITEMS = \beta_0 + \beta_1 COMP\text{-}DIFF + \beta_2 MFG.\ EXP + \beta_4 RANK + \varepsilon$							
CONSTANT			0.117	1.206	0.097	0.923	
COMP-DIFF		+	0.025	0.009	2.723	0.010*	1.049
MFG. EXP			0.219	0.134	1.639	0.111	1.326
RANK			−0.647	0.650	−0.995	0.327	1.318
Model: $R^2 = 0.226$ F-Ratio = 3.219	Adjusted $R^2 = 0.156$ Signif. $F < 0.035$						

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* Factor statistically significant at the $p \leq 0.05$ level.

NET UNAMBIG IA ITEMS = number of objectively positive internal audit items listed by auditors minus the number of negative;
NET AMBIG IA ITEMS = number of moderate internal audit items interpreted by auditors as positive minus the number of negative;
NET INVENTORY ITEMS = number of positive inventory items listed by auditors minus the number of negative;
COMP-DIFF = *TARGET-IA QUALITY* minus *PRIOR-IA QUALITY*;
MFG. EXP = number of years of auditor manufacturing experience; and
RANK = auditor rank within firm (1 = staff, 2 = senior, 3 = manager, 4 = partner).

positive with respect to the internal audit department.[13] The agreement level between the two coders was 94.5 percent (Kappa = 0.896, $p < 0.001$). The third author reconciled any differences. A composite measure was calculated by subtracting the number of moderate items documented as negative from the number documented as positive. The higher the composite measure, the more moderate items the auditors documented as positive and the less moderate items documented as negative. This measure was used to examine the impact that comparative differences had on auditors' interpretations of moderate information items as positive or negative.

The results from the regression using this composite measure as the dependent variable (*NET AMBIG IA ITEMS*) and *COMP-DIFF* as an independent variable are presented in Panel A of Table 6. They indicate that *COMP-DIFF* is statistically significant ($p < 0.001$) and positive (0.022), indicating that the more positive the comparative difference between the Target Company and the Prior Company, the more moderate items the auditors documented as positive and the less moderate items documented as negative.

These results are further corroborated by looking at the percentage of moderate items that auditors documented as negative or positive in the strong prior client internal audit group and weak prior client internal audit group. The percentage of moderate items that auditors listed as negative (positive) in the strong prior client internal audit group was 82.61 percent (17.39 percent) versus 5.88 percent (94.12 percent) in the weak prior client internal audit group ($\chi^2 = 23.02$, $p < 0.001$).[14] These findings suggest that the nature of the prior client impacted whether auditors interpreted moderate internal audit items as either negative or positive.

Finally, we examined the inventory items documented by auditors as significantly influencing their judgments to gain insight into the cascading of contrast effects on audit documentation. Two of the authors independently reviewed the factors listed by the auditors to determine whether they documented negative or positive inventory obsolescence information items. The agreement level between the two coders was 91.9 percent (Kappa = 0.909, $p < 0.001$). The third author reconciled any differences. The results from the regression with the auditors' inventory measures (positive items minus negative items) as the dependent variable (*NET INVENTORY ITEMS*) are presented in Panel B of Table 6 and indicate that *COMP-DIFF* is statistically significant ($p < 0.010$) and positive (0.025), indicating that the more positive the comparative difference between the Target Company and the Prior Company, the more positive inventory items and less negative inventory items that the auditors documented as influencing their judgments. We also examined the percentage of negative and positive inventory items documented by the strong prior client internal audit group and weak prior client internal audit group. The percentage of negative (positive) items documented by auditors in the strong prior client internal audit group was 72.00 percent (28.00 percent) versus 37.88 percent (62.12 percent) by the weak prior client internal audit group ($\chi^2 = 13.28$, $p < 0.001$).[15] These results suggest that the nature of the prior client impacted the types of items that auditors documented as affecting their *subsequent* judgments, providing additional evidence of the cascading of contrast effects.

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[13] Auditors described the factors that most significantly influenced their decisions. We coded moderate items as positive (negative) only when the auditor clearly characterized the item as being positive (negative) by making evaluative statements regarding the moderate item. For example, one moderate item relates to the level of internal audit turnover. We described the turnover as approximately 15 percent. It was characterized as positive in the following examples (these are verbatim from the audit memos): "Internal audit department has low turnover" and "Low turnover for internal audit." It was characterized as negative in the following examples: "Higher level of turnover" and "15 percent turnover seems high."

[14] Auditors in the no-prior-client group interpreted the same percentage of moderate items as positive (59.26 percent) or negative (40.74 percent) [$p > 0.05$].

[15] As might be expected, auditors in the no-prior-client group documented the same percentage of positive (57.15 percent) and negative (42.85 percent) items ($p > 0.05$).

V. SUMMARY

In this paper, we examine the situation where accounting decision makers make similar types of judgments using common information across multiple decision targets, within the same work session. Using an auditing framework to study this situation, our results indicate that auditors are highly susceptible to contrast effects in an internal audit framework. After evaluating a strong prior client, auditors assessed the internal audit quality of a target client as being significantly lower in quality than did auditors who evaluated a weak prior client or did not evaluate a prior client.

The magnitude of auditors' internal audit contrast effects significantly affected their assessments of the risk of inventory obsolescence for the target client, even while controlling for auditors' formal internal audit assessments. Specifically, while controlling for the formal internal audit quality assessment for the target client, auditors in the weak prior-client condition rated the risk of inventory obsolescence for the target to be significantly lower than those in the strong prior-client condition. Thus, auditors' judgments, as well as their documentation, for the target client were significantly and systematically affected by the presence of a prior client such that the same target client was evaluated as a function of the existence and quality of the prior client's internal audit department. These results extend both accounting and psychology research by demonstrating the cascading of contrast effects into subsequent decisions for which no comparative information is available. No prior study in psychology has specifically examined the impact of contrast effects on directly and indirectly related tasks.

The results have implications for audit practice. While the multi-client nature of the audit environment and the increased standardization of the audit process are a pervasive reality, such practices have the potential to cause unexpected and sometimes dysfunctional outcomes that may affect audit efficiency and/or effectiveness. If auditors are exposed to a prior client with a strong internal audit department, then they may under-use a target client's internal audit department, which could reduce audit efficiency. Alternatively, if auditors are exposed to a weak prior client, then they may over-use a target client's internal audit department, which could reduce audit effectiveness. The findings also indicate that due to the interconnectedness of the audit process, there is a cascading of contrast effects into subsequent audit decisions that also have efficiency and effectiveness implications. In particular, decisions such as assessments of inventory obsolescence are also affected by the contrast effects from prior judgments, such as those involving internal audit quality. Thus, the efficiency and effectiveness ramifications of contrast effects early in the audit process may be far reaching.

The results of this study also have implications for other accounting decision contexts. For example, financial analysts' forecasts may not only be based on the financial performance of the company they are analyzing, but also on the prior company just analyzed. Similarly, capital budgeting decisions may be influenced by the prior projects evaluated that could lead to over- or under-investment in a current project. In addition, since managers often conduct performance evaluations of multiple employees, susceptibly to contrast effects may lead to inaccurate performance ratings. Based on this potential of contrast effects to bias accounting judgments, future research should investigate mechanisms/training approaches that may serve to minimize the occurrence of contrast effects.

Potential limitations of this study provide several productive areas for future research. While this study focused on two general types of audit tasks, assessments of internal audit and inventory, future research could examine the influence of contrast effects for other types of audit or accounting tasks. In addition, since this study examined contrast effects for an ambiguous target client, future research could investigate contrast effects involving both positive and negative target clients. Such research would indicate the pervasiveness and limits of contrast effects on audit judgment. As this is the first study to examine the influence of the multi-client environment on auditor judgment, future research could examine the influence of other types of decision biases that may influence auditors' decision making while working on multiple clients. This research would enhance our understanding of the impact of the multi-client environment on audit efficiency and effectiveness. In addition, our findings indicate that prior accounting studies that have neither incorporated nor controlled for the role of contrast effects may be missing an essential element of the decision environment. Thus, future accounting research needs to further investigate contexts where accounting decision makers make multiple, similar judgments using common information.

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Audit Team Brainstorming, Fraud Risk Identification, and Fraud Risk Assessment: Implications of SAS No. 99

Tina D. Carpenter
University of Georgia

ABSTRACT: SAS No. 99 requires brainstorming sessions on each audit to help auditors detect fraud. This study investigates audit team brainstorming sessions and the resulting fraud judgments. The psychology literature provides mixed results on the benefits of brainstorming. Results from my experiment suggest that while the overall number of ideas is reduced, brainstorming audit teams generate more quality fraud ideas than individual auditors generate before the brainstorming session. Further, audit teams generate new quality fraud ideas during the brainstorming session. Results also suggest that audit teams' fraud risk assessments after the brainstorming session are significantly higher than those assessments given by individual auditors on the team prior to the brainstorming session, especially when fraud is present. These results should be informative to standard setters as they suggest that brainstorming audit teams' generation of new quality fraud ideas and their improved fraud risk assessments will likely enhance their ability to identify fraud.

Keywords: *fraud; brainstorming; audit teams; risk assessments.*

Data Availability: *Contact the author.*

I. INTRODUCTION

Detecting fraud is a high priority in the audit profession. Leaders of the profession argue that the future demand for audits will depend largely on auditors' ability to detect and deter fraud (Wilks and Zimbelman 2004a; Elliott 2002). Historically, the

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failure to detect fraud has proven costly to accounting firms (Bonner et al. 1998). Statement on Auditing Standards (SAS) No. 99, *Consideration of Fraud in a Financial Statement Audit,* contends that brainstorming will help auditors detect fraud, and the standard requires auditors to brainstorm about the possibilities of fraud on all audits (AICPA 2002). The Public Company Accounting Oversight Board (PCAOB) has emphasized that detection of fraud is an important objective of an audit and has urged auditors to take the requirements of SAS No. 99 seriously (PCAOB 2003). In this study, I investigate audit team brainstorming sessions and the resulting fraud judgments produced by brainstorming audit teams and the individual manager, senior, and staff auditors on the team.

This investigation is important for several reasons. First, SAS No. 99 introduces a new audit procedure that must be performed on every engagement, a brainstorming session. This brainstorming session was not required by previous fraud-related standards, SAS No. 53 (AICPA 1988) and SAS No. 82 (AICPA 1997). The implications of this standard's required brainstorming session have not been tested. While standard setters suggest that brainstorming sessions will be beneficial in helping auditors detect fraud, mixed results on the benefits of brainstorming have been reported in the psychology literature (Hill 1982; Diehl and Stroebe 1987; Gallupe et al. 1991; Nunamaker et al. 1991; Dennis and Valacich 1993). Osborn's (1957) seminal psychology work suggests that brainstorming can result in performance improvements (i.e., process gains) from stimulation and synergy among team members. However, much of the psychology research suggests that brainstorming results in process losses that outweigh process gains (Hill 1982; Diehl and Stroebe 1987; Gallupe et al. 1991; Nunamaker et al. 1991; Dennis and Valacich 1993). Most brainstorming studies in the psychology literature have been performed with undergraduate students brainstorming about hypothetical problems not related to their area of expertise. In contrast, brainstorming sessions required by SAS No. 99 are conducted by auditors with specific training and experience, which have been shown to be crucial in improving performance (Bonner and Lewis 1990). This study provides evidence on audit teams' performance in SAS No. 99 brainstorming sessions evaluating the likelihood of fraud, an important and complex consideration in their environment.

Second, prior research documents limitations in the way individual auditors make fraud judgments (Hackenbrack 1992; Hoffman and Patton 1997; Zimbelman 1997; Glover et al. 2003; Asare and Wright 2004; Wilks and Zimbelman 2004b) and suggests that auditors ultimately find it difficult to identify fraud (Pincus 1989; Jamal et al. 1995; Braun 2000; Knapp and Knapp 2001). However, individual auditor studies may not generalize to multi-person settings (Solomon 1987). Team judgments are most often different from those of individuals (Schultz and Reckers 1981; Hill 1982; McGrath and Kravitz 1982; Trotman et al. 1983; Miner 1984; Trotman 1985; Solomon 1987; Hinsz et al. 1997; Rich et al. 1997; Bedard et al. 1998). This study answers the call for research assessing whether auditors can overcome some of the limitations of working individually by working in teams (Solomon 1987; Libby and Luft 1993; Rich et al. 1997; Sutton and Hayne 1997). Because SAS No. 99 requires auditors to interact with audit team members to discuss fraud and to document the discussion, it is important to understand whether interacting audit teams overcome limitations in individual auditors' fraud judgments.

Auditors from the Big 4 accounting firms participated in a multi-phase experiment designed to investigate individual and team fraud judgments. There were 40 audit teams comprised of professionals at the staff, senior, and manager levels, for a total of 120 individual participants. The experiment employed a 2 × 2 design. The first independent variable, the *presence of fraud* in the financial statements (fraud or no fraud), is varied between participants. I manipulate *presence of fraud* by providing either fraudulent financial statements issued by a public company or the reissued and restated (i.e., fairly stated) financials of the same company.[1] The second independent variable, *group type*, (brainstorming audit team or nominal group) is a within-participants variable. The dependent variables are measured as auditors' quantity and quality of fraud ideas generated and auditors' fraud risk judgments.[2]

Results from my experiment suggest that even though the overall *quantity* of ideas is reduced in the brainstorming session, brainstorming audit teams generate more *quality* fraud ideas during the brainstorming session than the respective individual auditors (i.e., nominal group). That is, brainstorming audit teams (1) eliminate ideas that are not quality fraud ideas, and (2) generate new quality fraud ideas during the brainstorming session. The brainstorming audit teams' generation of new quality fraud ideas is significant as these new ideas reflect the audit team's ability to synthesize ideas generated by team members to create a list with more quality fraud ideas than the individual auditors created on their own. These findings are important because SAS No. 99 requires audit teams to document the fraud risks (i.e., fraud ideas) identified during the brainstorming sessions and to perform audit procedures in response to the identified risks (AICPA 2002). These results also contribute to the psychology brainstorming literature on quantity and quality of ideas. Even though the overall losses in the number of ideas (i.e., quantity) generated by brainstorming audit teams are consistent with the majority of brainstorming studies (e.g., Diehl and Stroebe 1987; Dennis and Valacich 1993), brainstorming audit teams' generation of new quality ideas is consistent with audit teams having process gains from stimulation and synergy as suggested by Osborn (1957).

Results also suggest that audit teams' fraud risk assessments after the brainstorming session are significantly higher than those assessments given by individual auditors (i.e., staff, senior, and manager) on the team prior to the brainstorming session, especially when fraud is present. These findings contribute to the fraud and multi-auditor literature as they suggest that auditors' interaction with other members of the team in the brainstorming session provides an opportunity for improvements in auditors' fraud risk assessments. In turn, these results support standard setters' guidance that brainstorming sessions should be conducted by audit teams (AICPA 2003).

In summary, the results of this study contribute to research aimed at improving auditors' fraud judgments when fraud is present and when it is not (Nieschwietz et al. 2000), to research evaluating the benefits of auditors working in teams (Solomon 1987; Libby and Luft 1993; Rich et al. 1997), to research examining the gains and losses associated with brainstorming (Diehl and Stroebe 1987; Dennis and Valacich 1993), and to standard setters about the new requirement for auditors to brainstorm about the possibilities of fraud.

The remainder of this paper is organized as follows. Section II provides background and hypotheses development. Section III outlines the experiment and methodology. Section IV provides the results, and Section V presents a summary of the research and conclusions.

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[1] Nieschwietz et al. (2000) suggest that while prior research has found increased auditor fraud risk assessments when fraud was present, it is important for future research to also evaluate auditors' fraud risk assessments in the more common "no fraud" scenario, since most auditors will not encounter fraud in their careers. They suggest that cases like the one used in Knapp and Knapp (2001), (i.e., fraud financial statements cited by the Securities and Exchange Commission [SEC] as committing fraud, with its restated financial statements) be used in the fraud and no fraud conditions to provide an appropriate benchmark for evaluating the "effectiveness" of auditors' fraud risk assessments (i.e., higher when fraud is present than when fraud is not present).

[2] I define a "quality fraud idea" as an idea generated by an individual auditor or audit team that clearly identified one of the fraudulent acts documented by the SEC for the sample company presented in the experimental materials.

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

SAS No. 99

SAS No. 99 defines fraud as "an intentional act that results in a material misstatement in financial statements that are the subject of an audit" (AICPA 2002, 6). Auditors have the responsibility "to plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether caused by error or fraud" (AICPA 2002, 3). Prior audit standards, SAS No. 53 (AICPA 1988) and SAS No. 82 (AICPA 1997), focused on a typical list of fraud risk factors that, in practice, were usually reduced to a checklist that individual auditors completed and included in their working papers (Shelton et al. 2001; AICPA 2002).

In contrast, SAS No. 99 cannot be reduced to a checklist or form. It introduces a new audit procedure, a brainstorming session that must be performed on every engagement. This session is defined as "an exchange of ideas or 'brainstorming' among the audit team members about how and where they believe the entity's financial statements might be susceptible to material misstatement due to fraud and how management could perpetrate and conceal fraudulent financial reporting" (AICPA 2002, 10). Standard setters suggest that this brainstorming session be conducted face-to-face during the planning phase of the audit. SAS No. 99 requires documentation of specific risks of material misstatement due to fraud that are identified during the session (i.e., fraud ideas) and the resulting fraud risk assessment (AIPCA 2002, 2003).

Prior research in psychology suggests that both the quantity and quality of ideas generated by brainstorming should be examined (Diehl and Stroebe 1987). Brainstorming has both an emphasis on quantity in generating as many ideas as possible, and an emphasis on quality in coming up with good ideas (Diehl and Stroebe 1987). If auditors generate as many ideas about fraud as possible without any regard to the quality of these ideas, then significant inefficiencies for the audit could result. On the other hand, if the audit team fails to identify a critical fraud area in their brainstorming session, then the effectiveness of the audit could be compromised. Because SAS No. 99 requires audit teams to document these fraud ideas (i.e., fraud risks), and to perform procedures in response to these ideas, the quality of the fraud ideas on the final list produced as a result of the brainstorming session could be more important than the overall quantity of the ideas listed.

Brainstorming Teams versus Nominal Groups: Overall Quantity of Ideas Generated

Although standard setters suggest that brainstorming among the audit team members will help auditors better detect fraud, the psychology literature reports mixed results on the benefits of brainstorming (e.g., Hill 1982; Diehl and Stroebe 1987; Gallupe et al. 1991; Nunamaker et al. 1991; Dennis and Valacich 1993). Osborn's (1957) seminal psychology work on brainstorming reported that brainstorming teams experienced an increase in productivity for idea-generation tasks. Osborn (1957) suggested that communication among team members can result in performance improvements (i.e., the ability to generate more ideas) through stimulation and synergy, which allow teams that communicate to outperform individuals who do not communicate. Stimulation and synergy are created when a participant is motivated to build on the ideas of others on the team. These performance improvements are referred to as process gains in the psychology literature (Nunamaker et al. 1991; Dennis and Valacich 1993). While Osborn's (1957) work on brainstorming suggested process gains for brainstorming teams, this benefit has remained illusory (Dennis and Valacich 1993).

In contrast to Osborn (1957), much of the psychology research finds that brainstorming results in process losses. Indeed, in a comprehensive literature review of more than 50 brainstorming studies, Dennis and Valacich (1993) concluded that face-to-face brainstorming teams do not outperform nominal groups in the number of ideas generated because process losses outweigh process gains. In general, these studies have compared nominal groups (i.e., total unique ideas of collective individual judgments developed prior to a brainstorming session) to face-to-face brainstorming teams to determine whether communication among members improves or impairs performance. Prior research suggests that two important factors that result in process losses for brainstorming teams are production blocking and social loafing. Production blocking occurs because only one member can communicate at a time and because members are talking and listening, while waiting to contribute an idea that may be lost before they take their turn (Diehl and Stroebe 1987). Free riding or social loafing is the reduction of effort of some of the team's members even when they are qualified to contribute fully (Diehl and Stroebe 1987).

SAS No. 99 brainstorming sessions have both similarities and differences with brainstorming examined in psychology. SAS No. 99 brainstorming sessions are different in that they involve professional auditors with specific training and experience who are evaluating the likelihood of fraud, which is an important and complex consideration in their environment. Because of the importance of individual auditors' reputations to their team members, the reputation of the team to the firm, and their overall reputation as professionals to investors, a team of auditors brainstorming to comply with SAS No. 99 is less likely than a team of students to suffer from social loafing.

However, SAS No. 99 brainstorming sessions are similar to those examined in psychology in an important way that could lead audit teams to suffer the same process losses that are documented for teams in psychology. Specifically, production blocking is caused by individuals in a team not being able to communicate at the same time. Listening to the ideas of other team members may prove distracting to individuals, thereby preventing them from contributing their own unique ideas because the ideas seem less relevant or less original when it is their turn to speak. Psychology research suggests that production blocking could be the strongest process loss that has been shown to cause brainstorming teams to generate fewer overall unique ideas than nominal groups (Nunamaker et al. 1991; Dennis and Valacich 1993). It seems likely that audit teams will be influenced by the nature of communication (i.e., only one person speaking at a time) similar to teams studied in psychology. Whether audit teams will generate more process losses than gains is an empirical question. Because it is unclear how the general findings in psychology will apply in the auditing context, the first hypothesis is stated in the null form. Stated formally:

H1: Brainstorming audit teams will generate a number of ideas no different from the number generated by the nominal groups.

Brainstorming Teams versus Nominal Groups: Number of Quality Fraud Ideas Generated

Diehl and Stroebe (1987) argue that the ultimate value of brainstorming lies in the production of good ideas, so the number of good ideas appears to be the most appropriate measure of quality when evaluating ideas generated. Compared to the general results on quantity of ideas reported in a large number of studies, the results with regard to the quality of ideas have been more equivocal.[3] Compared to the homogeneous teams of peers studied in psychology, hierarchical teams of auditors are more likely to develop synergies among the team members, where each team member contributes different experiences thus enabling them to build on the ideas of their other team members. Researchers suggest that these synergies created from varying levels of experience and knowledge result in additional process gains that could outweigh the process losses generated by communication among the team (Osborn 1957; Dennis and Valacich 1993).

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[3] Diehl and Stroebe (1987) review three studies that have examined the number of good ideas. Two of these studies show a loss of ideas by brainstorming teams when compared to nominal groups, and the other study found no differences when comparing brainstorming teams with nominal groups (Diehl and Stroebe 1987).

While there is limited evidence in psychology on the quality of ideas generated by brainstorming teams (Diehl and Stroebe 1987), there is more general evidence that team interaction improves the quality of decision making because the interaction between the individuals resolves implicit differences of opinion (e.g., Sniezek 1992), and team members correct each other's errors, thereby increasing the probability of generating a correct or optimal response (Hill 1982). Similarly, relying on these theories in psychology, the accounting literature provides evidence that suggests the quality of interacting audit teams' judgments is higher than that of a nominal group of individual auditors. Trotman (1985) hypothesized and found that interacting teams outperformed nominal groups because of audit teams' ability to differentiate the relative expertise of team members in performing an inventory valuation task.

The nature of the hierarchical audit teams in practice, where team members have designations of staff, senior, or manager, makes it easier for auditors to identify the member of the team with the most experience, likely the best member of the team. SAS No. 99 requires key engagement team members to participate in the brainstorming session, so these brainstorming sessions are conducted with interacting hierarchical teams of auditors with varying levels of expertise. Thus, if audit teams can identify their best member, this could be advantageous to audit teams for both reducing process losses and in generating process gains. I predict that brainstorming audit teams of managers, seniors, and staff will generate process gains from synergies of its team members building on the ideas of others and will thus generate more quality fraud ideas than the respective individual team members (i.e., nominal group). Stated formally:

> **H2:** Brainstorming audit teams will generate more quality fraud ideas than those generated by the nominal groups.

Brainstorming Teams versus Nominal Groups: Fraud Risk Assessments

In addition to documenting the fraud risks (i.e., fraud ideas) identified during the brainstorming sessions, SAS No. 99 requires an estimate of the likelihood of fraud. Standard setters suggest that brainstorming sessions remind each auditor of the possibility of fraud on every audit. This increase in auditors' overall awareness of fraud (AICPA 2003) will likely increase auditors' fraud risk assessments. Prior research in psychology and accounting suggests that interacting teams perform differently than individual auditors. Therefore, one cannot simply combine the individual decisions of all members of a team (i.e., nominal group judgment) to approximate the decision that would have been made by the interacting team (Hill 1982; Trotman 1985; Trotman and Yetton 1985; Sniezek 1992; Reckers and Schultz 1993; Henry 1995). If some bias or other tendency predisposes individuals to process information in a particular way, then teams exaggerate this tendency (Hinsz et al. 1997).[4] Given that brainstorming increases the salience of fraud, a brainstorming team's fraud risk assessment will likely be higher than the average fraud risk assessment of the individual members of the team (i.e., the nominal group) regardless of whether fraud is present. Stated formally:

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[4] For example, if a task directs individuals to be risky, then they are more risky after team interaction. Likewise, if a task directs individuals to be more cautious, then they are more cautious after team interaction (see Myers and Lamm 1976; Plous 1993). This is known as the "risky shift" or "choice shift" phenomenon (Stoner 1968).

> **H3a:** The fraud risk assessments of the brainstorming audit team will be higher than those of the nominal group.

If all auditors' fraud risk assessments increase as a result of brainstorming audit team interaction as predicted in H3a, regardless of whether fraud is present, there could be associated costs when fraud is not present as increased fraud risk assessments may lead to over-auditing (Nieschwietz et al. 2000). It is thus important for auditors to assess the risk of fraud effectively (i.e., higher when fraud is present than when fraud is not present). Although the fraud risk assessments of individual auditors have been examined in prior research (e.g., Hackenbrack 1992; Hoffman and Patton 1997), an objective benchmark was not used in those studies to make comparisons of auditors' risk assessments when fraud was present relative to the more common scenario of when fraud was not present (Nieschwietz et al. 2000). Knapp and Knapp (2001) provide this critical benchmark in their study of individual audit managers and audit seniors. They found that managers provide effective fraud risk assessments (i.e., higher when fraud is present than when fraud is not present), but that seniors do not. While the Knapp and Knapp (2001) study provides an important benchmark for evaluating auditors' fraud risk assessments, it only evaluates the individual judgments of auditors and does not evaluate audit teams. Prior research documents limitations in the way individual auditors make fraud judgments (Hackenbrack 1992; Hoffman and Patton 1997; Zimbelman 1997; Glover et al. 2003; Asare and Wright 2004; Wilks and Zimbelman 2004b) and suggests that auditors ultimately find it difficult to identify fraud (Pincus 1989; Jamal et al. 1995; Braun 2000). However, there may be a difference between individual auditors and audit teams because, in general, audit teams produce higher quality judgments than do individual auditors (Solomon 1987; Rich et al. 1997).

Even though audit teams are expected to increase their fraud risk assessments in general as a result of the increased salience of fraud in the brainstorming session, it is still possible for brainstorming audit teams to have more effective fraud risk assessments (i.e., higher fraud risk assessments when fraud is present relative to when fraud is not present) than nominal groups. As previously suggested, audit teams outperform nominal groups if they are able to differentiate the relative experience of team members (Trotman 1985), and auditors with experience provide effective fraud risk assessments (Knapp and Knapp 2001). Because the hierarchical nature of SAS No. 99 brainstorming audit teams makes it easier to recognize the member of the team with the most experience, I expect that the brainstorming audit team, where the manager communicates with the senior and staff, should have more effective fraud risk assessments (i.e., higher when fraud is present than when fraud is not present) than the nominal group (i.e., average of the individual staff, senior, and manager on each team) prior to the brainstorming session. Stated formally:

> **H3b:** The fraud risk assessments of the brainstorming audit teams will be more effective than those of the nominal groups.

III. EXPERIMENT AND METHODOLOGY

Participants

Forty three-person hierarchical audit teams, with auditors from each of the Big 4 firms, participated in the experiment. Each audit team consisted of a staff auditor, a senior, and a manager, resulting in 120 individual auditor participants. On average, the managers had 7.75 years of experience, the seniors had 3.19 years of experience, and the staff had 0.52 years of experience.[5]

Research Design

The experiment had two phases: pre-brainstorming and brainstorming. In Phase I, participants individually completed the experimental task. This ensured that the participants were familiar with the case before brainstorming with team members and provided individual pre-brainstorming responses for measuring any change in position arising from the brainstorming session. In Phase II, participants took part in a brainstorming session in which they were assigned to teams of three auditors consisting of a staff, senior, and manager. Following the brainstorming session, individual auditors provided demographic information.[6] I observed each session to ensure that participants had the appropriate materials for each phase and followed all instructions. The experiment employed a 2 × 2 design. The first independent variable, the *presence of fraud* in the financial statements (fraud or no fraud) was varied between-participants. The second independent variable, *group type*, (brainstorming audit team or nominal group) was a within-participants variable. This within-participants variable is important to measure whether brainstorming improves auditors' judgments beyond a combination of individual auditor judgments (e.g., Trotman 1985).

Case Materials and Procedures

I constructed two versions of the case, the fraud condition containing fraud in the financial statements as issued, detected by the SEC, and cited in an Accounting and Auditing Enforcement Release (AAER), and the no fraud condition containing the restated financial statements where the SEC required the fraudulent results to be corrected. Using historical financial statements of a real company cited by the SEC as committing financial statement fraud has three advantages. First, the fraud and no fraud (restated) financial statements provide a benchmark for evaluating auditor effectiveness in assessing the risk of fraud. Second, actual financial statements enhance the external validity of the task (Nieschwietz et al. 2000; Knapp and Knapp 2001). Third, the fraudulent acts identified by the SEC provide a criterion for evaluating the quality of ideas provided by the auditors during brainstorming in the case materials. Although the financial statements were based on the public disclosures of an actual company, the company's identity was disguised.[7] The case began with a narrative description of the company that covered its competition, management, markets, and products. A set of financial statements with related notes followed. The case also included common-size balance sheets, income statements, and selected financial ratios.

Despite the presence of financial statement fraud, the company received an unqualified opinion. The SEC charged the company with using a variety of techniques to fraudulently overstate earnings, and required the company to restate and reissue corrected statements.[8] Seven different fraudulent acts were described by the SEC, five of which are described as "typical frauds" in the SAS No. 99 implementation guidance. These five include: recognizing revenue in the improper period; recognizing revenue that does not meet the proper criteria under GAAP; improper capitalization of costs; unreasonable changes to the estimates of fair value; and manipulation of expenses and reserves. The other two frauds identified were improper deferment of tax credits and inappropriate sales of investment portfolios. These seven frauds provide the basis for the $3 billion restatement required by the SEC to eliminate the fraudulent results and, thus, represent the key differences between the fraud and no fraud conditions in the case materials. The fraudulent statements (including $3 billion of fraud) were presented to the participants in the fraud condition, and the restated financial statements (excluding $3 billion of fraud) were presented in the no fraud condition.

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[5] Neither firm nor location had an effect on the results in this study.

[6] Having two phases allows for a powerful test of individual and team responses and captures any change within the individual as a result of the brainstorming session (Hegedus and Rasmussen 1986; Bamber et al. 1996; Gigone and Hastie 1997).

[7] In the post-experimental questionnaire, participants were asked if they could determine the identity of the real company used in the case materials. Only one out of 120 auditors correctly identified the company. Identification of the real company had no effect on the results reported.

Removing the $3 billion fraud resulted in significant differences in a majority of the accounts on the income statement and the balance sheet, analytic ratios, and several other indicators that signaled high fraud risk in the fraud condition. For example, in the analytic financial ratios section of the case materials, the age of accounts receivables was provided to participants in both conditions. In the fraud condition, this value was almost double that provided in the no fraud condition. Additionally, this value was on average 90 days in the fraud condition, which according to SAS No. 99 should have been a fraud risk factor leading to increased risk of fraud. Further, the disclosures related to revenue recognition that were provided to the participants in the notes to the financial statements were also significantly different between the two conditions. Two significant revenue recognition policies, which were required to be disclosed under GAAP, were omitted by the company in the fraud condition, generating another fraud risk factor that should have led to auditors' higher fraud risk assessment. These disclosures were provided in three paragraphs that were required by the SEC to be added in the restated financials (no fraud condition), resulting in another key difference between the two conditions. Participants in each session were randomly assigned to the experimental conditions. Each participant was also assigned to a team to ensure consistent materials and treatments for each member of the team.

Phase I

In Phase I of the experiment each individual auditor was provided the case materials and was asked to perform preliminary analytical procedures on a new client's financial statements with instructions that they would be assessing the risk of fraud in this phase of the audit.[9] The auditors were asked to assume that they were in the initial planning stages of the audit. They were then asked to list unusual items (i.e., unexpected fluctuations) noted in the financial statements and provide potential explanations for the unusual items noted.[10] After completing the analytical procedures, auditors were asked to list how and where they believed the entity's financial statements might be susceptible to material misstatement due to fraud and how management could perpetrate and conceal fraudulent financial reporting. These instructions were taken directly from SAS No. 99 (AICPA 2002, 10). Finally, participants were asked to make a fraud risk assessment.

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[8] This company settled with the SEC and paid a fine in excess of $5 million for the alleged fraud. Members of top management were terminated and barred from serving as managers or accountants indefinitely, and there is ongoing litigation against the independent auditors. The SEC documented seven different financial reporting fraudulent acts that were material to the financial statements of this public company, five of which were listed as "typical financial reporting frauds" in the SAS No. 99 implementation guidance (AICPA 2003). The similarities of the fraud in the company used in this experiment to those documented in other companies where financial statement fraud was charged by the SEC enhance the generalizability of the results.

[9] All case and experimental materials were reviewed by audit partners from each of the Big 4 firms to ensure realism of the materials and congruence with the brainstorming procedures and tasks auditors performed in practice. In addition, all materials were pilot-tested, resulting in minor changes made to the wording of the initial materials. Partners were not used in this experiment because of their involvement in reviewing the materials and coordinating each of the 14 office visits where the experiment was administered.

Each of the measures collected in Phase I was used to obtain auditors' initial judgments prior to Phase II, the brainstorming session. After Phase I, the completed materials were collected and retained for analysis. However, because the research questions do not involve memory considerations, the participants were able to retain a copy of their individual answers (e.g., Libby et al. 1987), just as they would in actual practice. The auditors completed each task in Phase I individually. They were not allowed to use reference materials or to confer with one another while completing this phase of the experiment. Phase I of the experiment took approximately 45 minutes to complete.

Phase II

Phase II was the brainstorming session, which began after all participants had completed Phase I. Audit teams sat face-to-face around a table to discuss their ideas.[11] In Phase II, the participants used the same financial statement case as used in Phase I. Individuals did not record their own ideas as they had done in Phase I. Instead, a designated recorder was randomly selected in each brainstorming audit team to record the team's conclusions.[12] Each team was asked to brainstorm as a team and list how and where they believed the entity's financial statements might be susceptible to material misstatement due to fraud and how management could perpetrate and conceal fraudulent financial reporting. Each team was also asked to provide a team fraud risk assessment. No time limits were imposed on the brainstorming session. Given that Phase I had familiarized auditors with the case, the audit team members immediately began brainstorming in Phase II. On average, brainstorming audit teams spent 18 minutes in this phase of the experiment.

When a team completed the brainstorming session in Phase II, all experimental materials were collected. Participants then individually completed a debriefing questionnaire requesting background information.

Dependent Measures

I use three dependent measures to test the hypotheses. I analyze quantity of ideas for H1, quality of ideas for H2, and fraud risk assessments for H3a and H3b. To calculate the number of ideas for H1, another independent coder with prior public accounting experience (who was blind to the hypotheses) and I analyzed the transcripts. We assessed the quantity of ideas by counting the number of ideas listed by each individual auditor (i.e., staff, senior, and manager) as well as those listed by the brainstorming audit teams. The overall unique number of ideas for the nominal group is the sum of the number of ideas listed by each individual in the group after deleting redundancies. Inter-rater coding was the same 99 percent of the time, and all differences were mutually resolved. To calculate the number of quality fraud ideas for H2, we used the fraudulent acts identified by the SEC that were documented in the AAER and SEC claim.

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[10] Specific fraud risk instructions have been found to improve auditors' judgments and analytical procedures have been used in prior literature to aid auditors in formulating fraud judgments (Knapp and Knapp 2001). Based on this prior literature and the standard setters' urging of auditors to prepare for brainstorming sessions by "considering any unusual or unexpected relationships that have been identified in performing analytical procedures" (AICPA 2002, 12), these instructions were given to all participants in Phase I of the experiment.

[11] Based on discussions with partners at the Big 4 firms, in practice, all audit teams are encouraged to brainstorm face-to-face on each engagement as part of the planning stage of the audit. Specifically, they brainstorm about how and where they believe the entities' financial statements might be susceptible to material misstatement due to fraud and how management could perpetrate and conceal it in accordance with the SAS No. 99 implementation guidance (AICPA 2002, 2003).

[12] The rank of the individual on the engagement team who served as the team recorder had no significant influence on any of the results reported in this study.

We coded an idea as a "quality fraud idea" if it clearly identified a fraud specific to the case. For example, "improper revenue recognition" would not have been sufficient without specifically describing details from the financial statements presented in the case materials. Instead, an answer of "significant earnings pressure caused by poor performance led to revenue recognition fraud such as management manipulating fair value allocations and cut-off issues" would have been coded as a quality fraud idea. Inter-rater coding was the same 94 percent of the time, and all differences were mutually resolved. I measure the number of quality fraud ideas as the overall unique ideas listed after deleting redundancies.[13] The quality fraud ideas for the brainstorming audit team were those listed during the brainstorming session in Phase II; the quality fraud ideas for the nominal group were the total unique number of quality fraud ideas listed by the same individual auditors in Phase I in the fraud condition.

The dependent variable used to test H3a and H3b was provided by participants' assessments of the likelihood of fraud using an 11-point Likert scale with the endpoints labeled "Extremely Unlikely" and "Extremely Likely." The audit team provided its fraud risk assessment following the brainstorming session in Phase II. I calculated the fraud risk assessment for the nominal group as the average of the three risk assessments provided by the respective individual auditors in Phase I. This allowed each brainstorming audit team in Phase II to be matched with its individual members in Phase I.[14]

IV. RESULTS

Manipulation Checks

Although participants were not told whether the financial statements were fraudulent, the results indicate that the presence of fraud manipulation was successful. As discussed earlier, the seven fraudulent acts identified by the SEC represent the key differences between the fraud case and the no fraud case.[15] Experienced auditors were able to identify these frauds and provided higher fraud risk assessments in the fraud condition than in the no fraud condition. Manager auditors' pre-brainstorming mean fraud risk assessments in the fraud and no fraud condition were 7.35 and 6.40, respectively, and these risk assessments are significantly different ($p = 0.035$, one-sided). This finding indicates a successful manipulation of fraud and no fraud conditions.

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[13] For example, if each of the three team members listed two quality fraud ideas, but one of the ideas was listed by each individual, then that idea would only be counted once, resulting in a total of four unique quality ideas for the nominal group.

[14] This technique provides the most useful comparison of teams to nominal groups because it uses the team's members themselves as the statisticized comparison group. Specifically, it combines the judgments of the individual members of the team into one value (i.e., nominal group) to compare to that of the team. Thus, the relevant comparison is within teams (Gigone and Hastie 1997).

[15] Using a similar case where fraud was charged by the SEC (i.e., a fraud case) and its respective restated financial statements (i.e., no fraud case), Knapp and Knapp (2001) found that managers were effective at distinguishing between fraud and no fraud cases (i.e., they had higher fraud risk assessments when fraud was present than when fraud was not present), but seniors were not. While staff did not participate in their study, staff are expected to have less experience than seniors and are thus expected to be less effective. Consistent with these findings, the senior and staff fraud risk assessments are not used in this analysis, but they are reported in Table 3.

Tests of Hypotheses

Hypothesis 1 was stated in the null form, because it was unclear whether the number of ideas generated by brainstorming audit teams would be more or less than the number of ideas generated by nominal groups. The alternative would suggest a main effect for *group type*. Panel A of Table 1 presents the descriptive statistics for overall number of ideas. Panel B presents the related repeated-measures ANOVA with *presence of fraud* (fraud or no fraud) as the between-participants independent variable, and *group type* (brainstorming audit team or nominal group) as the within-participants independent variable.

Table 1, Panel A shows that the mean number of unique ideas (i.e., quantity of ideas) generated by the brainstorming audit team was 7.45, while the nominal group generated a mean of 12.80 ideas. The main effect for *group type* presented in Panel B suggests that the number of ideas generated by the brainstorming audit teams is significantly smaller than that of the nominal groups ($p < 0.001$), regardless of whether fraud was present.

Hypothesis 2 predicts that brainstorming audit teams will generate more quality fraud ideas than nominal groups. Thus, a main effect for *group type* is predicted. Panel A of Table 2 presents the descriptive statistics for number of quality fraud ideas. Panel B presents

TABLE 1
Overall Quantity of Ideas[a,b]

Panel A: Mean (Standard Deviation) Number of Unique Ideas by Treatment for Individual Auditors, Nominal Groups, and Brainstorming Audit Teams

	Staff	Senior	Manager	Nominal Group	Brainstorming Audit Team
Fraud	4.40	4.85	6.15	13.10	7.90
	(2.06)	(1.95)	(3.07)	(3.39)	(2.31)
No Fraud	2.75	4.80	5.05	12.50	7.00
	(1.25)	(2.48)	(2.42)	(3.80)	(2.77)
Overall Mean	3.58	4.83	5.60	12.80	7.45
	(1.88)	(2.21)	(2.78)	(3.57)	(2.56)

Panel B: Results of a Repeated-Measures ANOVA of Presence of Fraud Between-Participants on Quantity of Ideas for Nominal Groups and Brainstorming Audit Teams

Source of Variation	Df	SS	MS	F-Statistic	p-value
Between-Participants					
Presence of Fraud	1	11.25	11.25	0.90	0.349
Error	38	474.50	12.49		
Within-Participants					
Group Type	1	572.45	572.45	81.75	0.000
Presence of Fraud × Group Type	1	0.45	0.45	0.06	0.801
Error	38	266.10	7.00		

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[a] Descriptive statistics for participants represent the cell mean for the *presence of fraud* (fraud, no fraud) and *group type* (individual, nominal group, brainstorming audit team) treatment combinations. n = 20 in each cell, with a total of 40 for each type of individual (staff, senior, manager), 40 nominal groups, and 40 brainstorming audit teams.

[b] Participants were asked to list *how and where they believe the entity's financial statements might be susceptible to fraud and how management could perpetrate and conceal it.* The quantity of the idea units were counted as the total number of ideas generated. For the nominal group, this number represents the overall number of ideas of each individual staff, senior, and manager after deleting any redundant ideas.

TABLE 2
Overall Quality of Ideas[a,b]

Panel A: Mean (Standard Deviation) Number of Unique Quality Fraud Ideas by Treatment for Individual Auditors, Nominal Groups, and Brainstorming Audit Teams

	Staff	Senior	Manager	Nominal Group	Brainstorming Audit Team
Fraud	0.35 (0.59)	0.65 (0.67)	1.80 (1.15)	2.20 (1.13)	2.60 (1.07)

Panel B: Results of a Repeated-Measures ANOVA of Quality of Ideas for Nominal Groups and Brainstorming Audit Teams

Source of Variation	Df	SS	MS	F-Statistic	p-value
Within-Participants					
Group Type	1	4.80	4.80	11.24	0.001
Error	59	25.20	0.43		

[a] Descriptive statistics for participants represent the cell mean for the *fraud condition* only and *group type* (individual, nominal group, brainstorming audit team) treatment combinations. n = 20 in each cell, with a total of 20 for each type of individual (staff, senior, manager), 20 nominal groups, and 20 brainstorming audit teams.

[b] Participants were asked to list *how and where they believe the entity's financial statements might be susceptible to fraud and how management could perpetrate and conceal it.* The quality of the idea units were coded as quality fraud ideas if they matched one of the fraudulent acts identified by the SEC for this company. For the nominal group, this number represents the overall number of ideas of each individual staff, senior, and manager after deleting any redundant ideas.

the related repeated-measures ANOVA with *group type* as the within-participants independent variable. This analysis is performed for only participants in the fraud condition, as the "quality" fraud ideas were identified by the SEC for the fraud case.[16]

Table 2, Panel A shows that the mean number of unique quality fraud ideas generated by the brainstorming audit team was 2.60, while the nominal group generated a mean of 2.20 ideas. The main effect for *group type* presented in Panel B suggests that the number of quality fraud ideas generated by brainstorming audit teams is significantly greater than those of the nominal groups ($p = 0.001$). Thus, H2 is supported.

While the combined results from H1 and H2 imply that brainstorming audit teams reduced the number of ideas that were not "quality" fraud ideas (i.e., since these brainstorming audit teams had less overall number of ideas, but more quality fraud ideas than the nominal group), I conducted additional analysis to test this implication. Specifically, brainstorming audit teams generated a mean of 5.47 non-quality ideas, less than the mean 11.12 non-quality ideas generated by the nominal group ($t = 17.21$, $p < 0.001$). This suggests that the brainstorming audit teams increase the number of quality fraud ideas and reduce the number of ideas not considered quality fraud ideas that were generated by the individual auditors prior to the brainstorming session.

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[16] Since it is difficult to identify a quality idea in the no fraud condition because the frauds identified by the SEC in the fraudulent financial statements (fraud condition) have been removed in the restated financial statements (no fraud condition), I performed the analysis to test H2 in the fraud condition only. Additional analyses suggest, however, that the number of quality fraud ideas generated by those in the fraud condition was significantly higher than the number of quality fraud ideas generated in the no fraud condition ($p = 0.001$). Brainstorming teams in the fraud condition generated a mean of 2.60 quality fraud ideas, greater than the mean 1.35 quality fraud ideas generated by those brainstorming teams in the no fraud condition. Pair-wise comparisons suggest that these differences are significant ($t = 2.96$, $p = 0.008$), providing additional support that the fraud-no fraud manipulation was successful.

I also conducted additional analysis on the ideas that were not included by brainstorming audit teams that were previously generated by nominal groups of individual auditors in the fraud condition. Of the total ideas that were not included (i.e., generated by the nominal group but not provided by the brainstorming team), 37.58 percent represent staff ideas, 38.26 percent represent senior ideas, and 24.16 percent represent manager ideas. Of these ideas that were not included by the brainstorming team, only 2.00 percent represent quality fraud ideas, so 98.00 percent of the ideas not included by brainstorming audit teams were non-quality ideas.

Of the quality fraud ideas generated by brainstorming audit teams, 9.62 percent represent staff ideas, 17.31 percent represent senior ideas, 51.92 percent represent manager ideas, and 21.15 percent represent new quality fraud ideas generated by brainstorming teams during the brainstorming session. Quality fraud ideas represent 50.00 percent of the total ideas generated by managers that were included by brainstorming audit teams, 33.33 percent of total senior ideas, and 23.81 percent of total staff ideas. These results combined with the finding that brainstorming audit teams generated more quality fraud ideas than the nominal group (i.e., the overall number of unique ideas combined from each team member) highlights the unique improvement of the brainstorming audit team in generating new quality fraud ideas that were not generated by the individual team members prior to the brainstorming session. These findings are consistent with audit teams having process gains from stimulation and synergy as suggested by Osborn (1957).

Hypothesis 3a predicts that the fraud risk assessments of brainstorming audit teams will be higher than those of nominal groups. Thus, a main effect for *group type* is expected. Panel A of Table 3 presents the descriptive statistics for fraud risk assessments. Panel B presents the related repeated-measures ANOVA with *presence of fraud* as a between-participants independent variable, and *group type* as a within-participants independent variable.

Table 3, Panel A shows that the mean fraud risk assessments of the brainstorming audit team of 7.18 is higher than the mean fraud risk assessments of the nominal group of 6.46. As predicted in H3a, the main effect for *group type* presented in Panel B suggests that the fraud risk assessments of brainstorming audit teams are significantly higher than those of the nominal groups ($p < 0.001$) whether or not fraud is present.[17] Thus, H3a is supported.

Hypothesis 3b predicts that the fraud risk assessments of brainstorming audit teams will be more effective than those of nominal groups. The main effect for the *presence of fraud* is significant ($p = 0.032$). Additional analysis reveals that the fraud condition nominal groups' mean fraud risk assessment of 6.62 is not significantly different from the no fraud condition nominal groups' mean fraud risk assessment of 6.30 ($t = 1.11$, $p = 0.281$). In contrast, the fraud condition brainstorming teams' mean fraud risk assessment of 7.45 is greater than the no fraud condition brainstorming teams' mean fraud risk assessment of 6.90 ($t = 1.87$, $p = 0.077$). These results suggest that prior to the brainstorming session individual auditors, on average, do not effectively assess the risk of fraud (i.e., as higher when fraud is present than when fraud is not present), but that following the brainstorming

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[17] Additional analysis using repeated-measures ANOVA to evaluate auditors' client business risk assessments revealed a significant main effect for *group type* suggesting that interacting audit teams' client business risk assessments are also significantly higher than those of the nominal groups ($p < 0.001$), thus showing a similar effect in an overall risk measure.

TABLE 3
Overall Fraud Risk Assessments[a,b]

Panel A: Mean (Standard Deviation) Fraud Risk Assessments by Treatment for Individual Auditors, Nominal Groups, and Brainstorming Audit Teams

	Staff	Senior	Manager	Nominal Group	Brainstorming Audit Team
Fraud	6.10	6.40	7.35	6.62	7.45
	(1.21)	(1.70)	(1.50)	(1.55)	(0.89)
No Fraud	6.25	6.25	6.40	6.30	6.90
	(1.33)	(1.25)	(1.31)	(1.28)	(0.85)
Overall Mean	6.18	6.33	6.88	6.46	7.18
	(1.26)	(1.47)	(1.47)	(1.43)	(0.90)

Panel B: Results of a Repeated-Measures ANOVA of Presence of Fraud Between-Participants on Fraud Risk Assessments of Nominal Groups and Brainstorming Audit Teams

Source of Variation	Df	SS	MS	F-Statistic	p-value
Between-Participants					
Presence of Fraud	1	3.76	3.76	3.65	0.032
Error	38	39.11	1.03		
Within-Participants					
Group Type	1	10.27	10.27	31.62	0.000
Presence of Fraud × Group Type	1	0.27	0.27	0.84	0.366
Error	38	12.34	0.33		

[a] Descriptive statistics for participants represent the cell mean for the *presence of fraud* (fraud, no fraud) and *group type* (individual, nominal group, brainstorming audit team) treatment combinations. n = 20 in each cell, with a total of 40 for each type of individual (staff, senior, manager), 40 nominal groups, and 40 brainstorming audit teams.

[b] Participants were asked to provide a fraud risk assessment, the likelihood of financial statement fraud, on an 11-point Likert scale with endpoints labeled 0, extremely unlikely and 10, extremely likely.

session, the brainstorming audit team more effectively assesses the risk of fraud. Thus, H3b is supported.[18]

Additional Analysis

SAS No. 99's implementation guidance suggests that the brainstorming session should foster sharing of ideas among both senior members and junior members of the audit team (AICPA 2003). Several researchers have suggested that some of the benefits of the audit team and its hierarchical structure come from an opportunity for individual members to learn from more experienced members of the team (Libby and Luft 1993; Rich et al. 1997; AICPA 2003). Because each brainstorming audit team in this study was comprised of an audit staff, senior, and manager, the data collected in this experiment provide an opportunity to evaluate the performance of these individuals to better understand the overall performance of the team.

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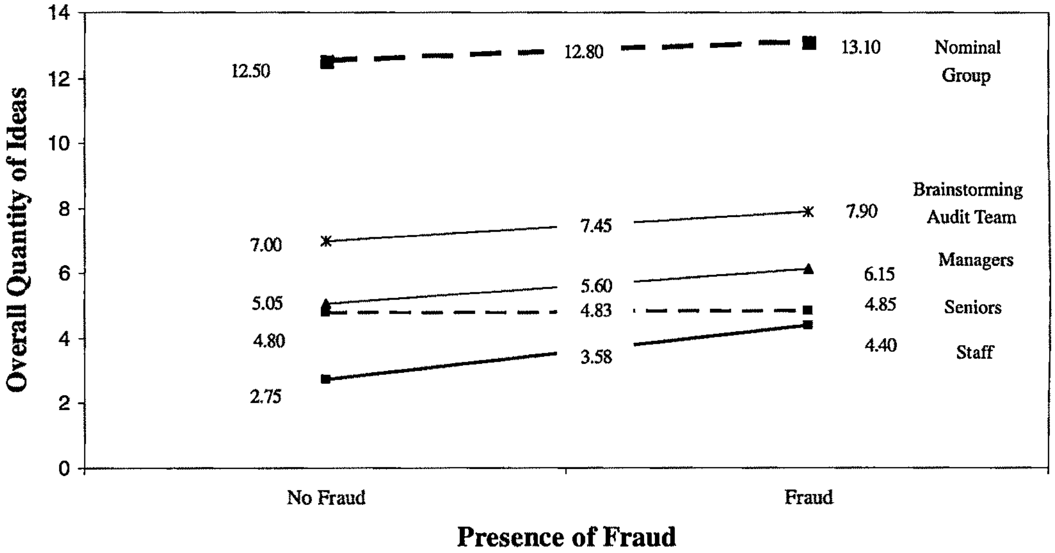
[18] Additional analysis was conducted using the following contrast weights (Buckless and Ravenscroft 1990; Rosenthal et al. 2000); Fraud/Brainstorming Team +3, Fraud/Nominal Group −1, No Fraud/Brainstorming Team −1, and No Fraud/Nominal Group −1. For the contrasts, the +3 weight on the Fraud/Brainstorming Team and the −1 weight on all other conditions reflects the expectation that brainstorming teams will have more effective fraud risk assessments (i.e., higher fraud risk assessments when fraud is present than when it is not) than the nominal group. This contrast testing provides additional support for H3b ($t = 4.83$, $p < 0.001$).

Panel A of Table 1 presents the descriptive statistics for individual auditors' quantity of ideas, and Panel A of Table 2 presents the descriptive statistics for the individual auditors' quality of ideas. Panel A of Table 3 presents descriptive statistics for individual auditors' fraud risk assessments. These statistics are presented by the *presence of fraud* treatment combinations for individual auditors (i.e., staff, senior, and manager) with comparisons to the nominal group and brainstorming audit team for the quantity of ideas and fraud risk assessments, and for the fraud condition only for the quality of fraud ideas.

Quantity of Ideas

The descriptive statistics presented in Table 1, Panel A and illustrated in Figure 1 show that the brainstorming team generated a mean number of 7.45 ideas, which is more than any individual auditor generated. Managers, seniors, and staff generated an average of 5.60 ideas, 4.83 ideas, and 3.58 ideas, respectively. Pair-wise comparisons between the brainstorming audit team and each individual auditor rank suggest that these differences are significant between the brainstorming audit team and the manager ($t = 3.66$, $p = 0.001$), and the senior ($t = 4.92$, $p < 0.001$), and the staff ($t = 8.65$, $p < 0.001$). Additional pairwise comparisons between each individual auditor rank suggest that these differences are significant between the manager and the staff ($t = 3.72$, $p = 0.001$), and the staff and the senior ($t = 2.45$, $p = 0.019$), but not between the manager and the senior at conventional levels ($t = 1.62$, $p = 0.112$). The brainstorming audit team appears to be synthesizing the ideas generated individually by the auditors prior to the brainstorming session to arrive at

FIGURE 1
Auditors' Overall Quantity of Ideas



This figure illustrates the mean number of overall quantity of ideas for the *presence of fraud* (fraud, no fraud) treatment combinations for individual auditors (staff, senior, and manager), nominal groups, and brainstorming audit teams. Participants were asked to list *how and where they believe the entity's financial statements might be susceptible to fraud and how management could perpetrate and conceal it.* The quantity of the idea units were counted as the total number of ideas generated. For the nominal group, this number represents the overall number of ideas of each individual staff, senior, and manager after deleting any redundant ideas.

a list of ideas that is greater than those of each manager, senior, and staff but less than the sum of their individual ideas after deleting redundancies. This finding is consistent with the brainstorming literature (e.g., Diehl and Stroebe 1987; Dennis and Valacich 1993), where the interacting team generates more unique ideas than did the individuals on the team but does not generate more ideas than the nominal group.

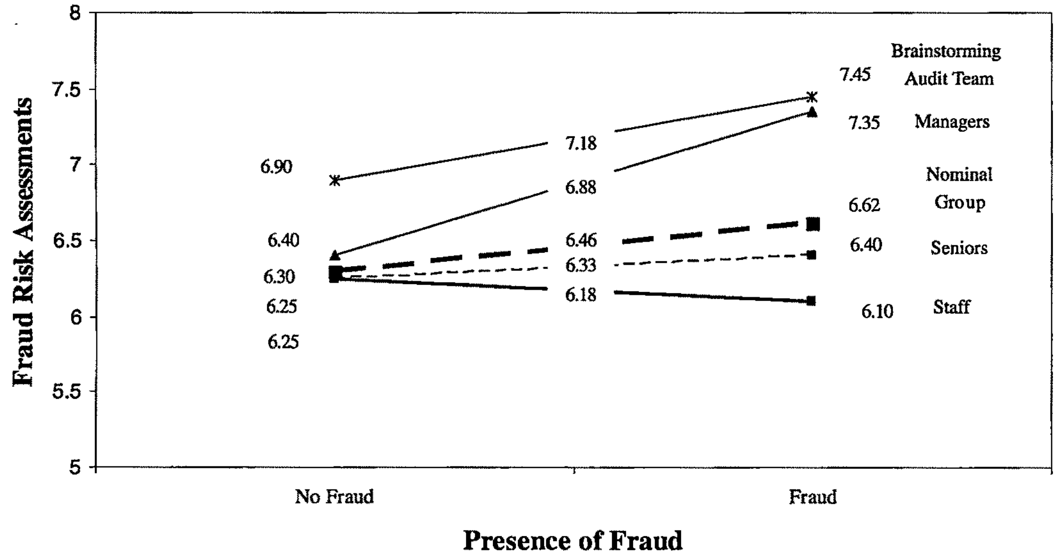
Quality of Ideas

The descriptive statistics presented in Table 2, Panel A show that the brainstorming team generated 2.60 quality fraud ideas, on average, in the fraud condition, while the managers generated 1.80 ideas, on average, in the fraud condition (t = 3.76, p = 0.001). This result supports the SAS No. 99 requirement for brainstorming sessions to be conducted with all engagement team members interacting to discuss the possibilities of fraud (AICPA 2002), and suggests that the brainstorming audit team builds on the quality fraud ideas generated by each individual auditor and improves, generating more quality fraud ideas beyond what the manager was capable of individually.

Fraud Risk Assessments

The descriptive statistics presented in Table 3, Panel A and illustrated in Figure 2 show that the brainstorming teams' mean fraud risk assessment of 7.18 is higher than the managers' mean fraud risk assessment of 6.88, the seniors' mean fraud risk assessment of 6.33, and staffs' mean fraud risk assessment of 6.18. Pair-wise comparisons between the brainstorming team and the individual auditors find significant differences between the

FIGURE 2
Auditors' Fraud Risk Assessments



This figure illustrates the mean fraud risk assessments for the *presence of fraud* (fraud, no fraud) treatment combinations for individual auditors (staff, senior, and manager), nominal groups, and brainstorming audit teams. Participants were asked to provide a fraud risk assessment, the likelihood of financial statement fraud, on an 11-point Likert scale with endpoints labeled 0, extremely unlikely and 10, extremely likely.

brainstorming audit team and staff ($t = 4.21$, $p < 0.001$), and seniors ($t = 3.93$, $p < 0.001$), but not managers ($t = 1.14$, $p = 0.262$). Additional pair-wise comparisons between auditor ranks find significant differences between managers and staff ($t = 2.62$, $p = 0.013$), between seniors and managers ($t = 1.84$, $p = 0.073$), but not between seniors and staff ($t = 0.506$, $p = 0.616$).

In general these findings are consistent with interacting teams (i.e., the brainstorming audit team) outperforming individual members of the team, but not always outperforming the best member (e.g., Hill 1982). When asked to select this best member in the post-experimental questionnaire, participants selected the manager as the best member of the team 77 percent of the time, followed by the senior 21 percent of the time and the staff 2 percent of the time.[19] Prior to the brainstorming session, managers were effective at assessing the risk of fraud (i.e., higher fraud risk assessments when fraud is present than when fraud is not present). Therefore, the similarity of brainstorming audit teams' fraud risk assessments to those of managers is a positive result. These findings suggest that the manager had a positive influence on the brainstorming audit teams' fraud risk assessment.

V. SUMMARY AND CONCLUSIONS

This study investigates audit team brainstorming sessions and the resulting fraud judgments produced by brainstorming audit teams and individual manager, senior, and staff auditors on the team. This study provides several implications that are informative about brainstorming sessions now required by SAS No. 99. First, results from my experiment suggest that, even though the overall quantity of ideas is reduced in the brainstorming session, brainstorming audit teams generate more quality fraud ideas during the brainstorming session than the respective individual auditors (i.e., nominal group). These findings are significant as they reflect the audit teams' ability to synthesize all of the ideas generated by the individual team members to create a list with more quality fraud ideas than the individual auditors created on their own and with fewer non-quality ideas. These results support the notion in the psychology and accounting team literature that interacting teams generally perform better than individuals (Schultz and Reckers 1981; Hill 1982; McGrath and Kravitz 1982; Trotman et al. 1983; Solomon 1982, 1987; Hinsz et al. 1997; Rich et al. 1997).

Second, results suggest that brainstorming audit teams generate new quality fraud ideas during the brainstorming session that were not previously identified by the manager, senior, or staff on the team. The brainstorming audit teams' generation of new quality fraud ideas found in this study is a new and important finding that is consistent with audit teams having process gains from stimulation and synergy as suggested by the seminal psychology research by Osborn (1957). Third, the results of this study are informative to standard setters by showing that, even though overall losses in the number of ideas (i.e., quantity) generated by interacting teams of auditors seem to mimic those of other interacting teams in a majority of brainstorming studies (e.g., Diehl and Stroebe 1987; Nunamaker et al. 1991), there are other possible benefits to the brainstorming session that extend beyond recording as many ideas as possible. In the auditing context, brainstorming sessions provide an opportunity for auditors to reduce non-quality ideas leading to improved audit efficiency, and generate new quality fraud ideas leading to improved audit effectiveness. These findings are important since SAS No. 99 requires audit teams to document the fraud risks (i.e., fraud ideas) identified during these brainstorming sessions and to perform audit procedures in response to the identified risks (AICPA 2002).

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[19] The hierarchical nature of audit teams, unlike many of the teams studied in psychology, likely makes it easier to select the best member as the manager because he is likely the most influential member of the team and has earned a designation of more experience than both the senior and the staff.

Finally, the results of this study also suggest that audit teams' fraud risk assessments after the brainstorming session are significantly higher than those assessments given by individual auditors on the team prior to the brainstorming session, especially when fraud is present. When fraud is present, increased fraud risk assessments after brainstorming sessions is a positive result. However, in the more common scenario, when fraud is not present, increased fraud risk assessments may lead to over-auditing, thus validating concerns that audit firms have about the efficiency of audits when they implement the new requirements of SAS No. 99.

The results suggest that prior to the brainstorming session, individual auditors, with the exception of the manager, are not effective at assessing the risk of fraud (i.e., providing higher fraud risk assessments when fraud is present than when fraud is not present). However, following the brainstorming session, the brainstorming audit team is more effective at assessing the risk of fraud. These results contribute to the fraud and multi-auditor literature by extending findings of fraud judgments provided by individual auditors with varying levels of experience to those of an interacting hierarchical team of auditors (staff, senior, and manager). While experience is a significant factor in the individual auditor's effectiveness at assessing the risk of fraud, the interaction with other members of the team in the brainstorming session provides an opportunity for improvements in auditors' fraud risk assessments. This result is important and supports standard setters' guidance that the audit team brainstorming sessions include both junior and senior members of the engagement team (AICPA 2003).

This study is subject to several limitations. First, to control for variability across audit teams in accordance with the psychology literature (Hill 1982; Miner 1984), I randomly assigned staff, senior, and managers to teams of three for the brainstorming session. While this study makes a contribution in that it evaluates an interacting hierarchical audit team, the interaction might have been different in a practiced (i.e., natural) team, or a team of auditors with the same level of experience. Second, I investigated the quantity and quality of fraud ideas generated during audit team brainstorming sessions and auditors' fraud risk assessments. The "quality" ideas definition is conservative because the ideas that met this distinction are only the actual frauds identified by the SEC in the fraud case. I expected that auditors would be able to raise issues that the SEC identified, but because some of the fraud areas in the case dealt with the absence of disclosure, this definition of quality ideas set a factual and realistic, but difficult, benchmark for auditors. Additionally, there are potentially other high-risk areas in this case that were not identified by the SEC that have thus not been included as "quality" ideas.

Third, this study examines the implications of the requirements of SAS No. 99 for auditors. Consistent with the requirements of this standard, individual auditors in this study were asked to perform analytical procedures on the case materials and list ideas of fraud on their own in preparation for the brainstorming session. Auditors in this study had these analytical procedures and these individual lists available to them during the brainstorming session, like auditors would have in practice. However, brainstorming audit teams may have benefited by auditors evaluating this case both as individuals and as a team. It is unclear how much these analytical procedures and individual evaluation of fraud ideas may have influenced participants' judgments. Additionally, I did not address other areas of planning for the detection of fraud in an engagement. Zimbelman (1997), Glover et al. (2003), and Asare and Wright (2004) suggested that auditors adjust the extent of their testing but not the nature of their tests. Future research can examine whether brainstorming sessions lead to a better match between risk identification, risk assessment, and audit procedures, and the extent to which auditor fraud judgments are influenced by the performance of analytical procedures.

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Accruals Quality and Internal Control over Financial Reporting

Jeffrey T. Doyle
Utah State University

Weili Ge
University of Washington

Sarah McVay
University of Utah

ABSTRACT: We examine the relation between accruals quality and internal controls using 705 firms that disclosed at least one material weakness from August 2002 to November 2005 and find that weaknesses are generally associated with poorly estimated accruals that are not realized as cash flows. Further, we find that this relation between weak internal controls and lower accruals quality is driven by weakness disclosures that relate to overall company-level controls, which may be more difficult to "audit around." We find no such relation for more auditable, account-specific weaknesses. We find similar results using four additional measures of accruals quality: discretionary accruals, average accruals quality, historical accounting restatements, and earnings persistence. Our results are robust to the inclusion of firm characteristics that proxy for difficulty in accrual estimation, known determinants of material weaknesses, and corrections for self-selection bias.

Keywords: *earnings quality; accruals quality; internal control; material weaknesses.*

Data Availability: *All data used in the paper are available from publicly available sources noted in the text; the data on internal control weaknesses are available in machine-readable form from the authors upon request.*

I. INTRODUCTION

In this paper we examine the relation between accruals quality and the internal control environment of the firm. By definition, when there is a material weakness in internal control, there is "more than a remote likelihood that a *material misstatement* of the

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annual or interim financial statements will not be prevented or detected" (PCAOB 2004) (emphasis added). A weak control environment has the potential to allow both (1) intentionally biased accruals through earnings management (e.g., lack of segregation of duties), and (2) unintentional errors in accrual estimation (e.g., lack of experience in estimating the bad-debt expense provision). Therefore, we hypothesize that reported material weaknesses will be associated with lower accruals quality.

While this relation has been suggested in prior literature (Kinney 2000), the lack of internal control data has generally precluded an empirical investigation and, therefore, the literature on earnings quality has been relatively silent on the matter of internal control over financial reporting. For example, neither of the two recent publications on earnings quality (Schipper and Vincent 2003; Dechow and Schrand 2004) mentions a possible relation between internal control and earnings/accruals quality. In this paper, we investigate this relation using a sample of 705 companies that disclosed material weaknesses in internal control over financial reporting from August 2002 to November 2005 under the new requirements of Sections 302 and 404 of the Sarbanes-Oxley Act of 2002.[1]

Using the accruals quality measure developed by Dechow and Dichev (2002), as modified by McNichols (2002) and Francis et al. (2005), we generally find that weak internal controls are associated with relatively low-quality accruals, as measured by weaker mappings of accruals into cash flows. This relation is robust to the inclusion of innate firm characteristics that proxy for the inherent difficulty in accrual estimation (e.g., length of the operating cycle and cash flow volatility [Dechow and Dichev 2002]) and additional determinants of material weaknesses that are likely to be directly correlated with accruals quality (e.g., profitability and complexity [Ge and McVay 2005; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007]).

Although our focus is on the Dechow and Dichev (2002) measure, which we feel is both theoretically and intuitively appealing, we also consider other common proxies for accruals quality: discretionary accruals (Jones 1991), average accruals quality (Dechow and Dichev 2002), historical restatements (Anderson and Yohn 2002), and earnings persistence (Schipper and Vincent 2003). For each of these measures, we find that weak internal controls are associated with lower accruals quality.

Finally, we find that the relation between weak internal controls and lower accruals quality is stronger for two groups of firms. First, only those firms with company-level material weaknesses, rather than more auditable, account-specific problems, have lower accruals quality. The finding that account-specific material weaknesses are not associated with lower accruals quality is consistent with auditors detecting and correcting auditable weaknesses through increased substantive testing prior to the issuance of the financial statements (e.g., Hogan and Wilkins 2006).

Second, material weakness disclosures made under Section 302 (versus those under Section 404) seem to be more strongly associated with lower accruals quality. We find that, on average, Section 404 disclosures are not associated with poorer accruals quality. However, when disclosures are broken down by account-specific versus company-level weaknesses, company-level Section 404 weaknesses are associated with poorer accruals quality.

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[1] Section 302 (applicable to all SEC filers and effective August 2002) requires that officers certify the financial statements, including the effectiveness of the internal control over financial reporting, and disclose any material changes in internal control. Section 404 (thus far effective November 2004 for accelerated filers only) requires management to issue a report on internal control over financial reporting that is subject to auditor attestation. Additional details are provided in Section II. Regardless of the origin of the material weakness disclosure, all else equal, we expect these disclosures to be informative about the quality of firms' accruals. We provide sample material weaknesses in Appendix A, Section II, and Section III.

Although there are several plausible explanations for the weaker results using the Section 404 disclosures, one obvious difference between Sections 302 and 404 is the increased level of scrutiny under Section 404, which requires an audit opinion on the internal controls by the external auditors. It is possible that external auditors applied a lower effective threshold for Section 404 compared to management's threshold under Section 302 and therefore identified a greater number of material weaknesses that lacked real financial reporting consequences. We discuss these results and other possible explanations later in Section IV.

Our paper makes two primary contributions. First, we extend the literature on earnings/accruals quality. Conceptually, it makes sense that a good internal control system is the foundation for high-quality financial reporting, since strong internal controls likely curtail both procedural and estimation errors, as well as earnings management. Our findings present empirical evidence to support this fundamental link between internal controls and accruals quality. In addition, our paper extends this basic research question by (1) examining the types of material weaknesses (company-level versus account-specific), (2) distinguishing between the Section 302 versus 404 reporting regimes, (3) using a cross-section of five earnings/accruals quality measures, and (4) controlling for self-selection bias through the use of both a Heckman (1979) two-stage process and a propensity score matching approach (LaLonde 1986).

Second, our paper provides empirical evidence on the effectiveness of Sections 302 and 404 of Sarbanes-Oxley. These sections have been among the most cumbersome of the new legislation, with many critics alleging that the costs of compliance far exceed any benefits. We find that the most informative material weakness disclosures (i.e., those that are associated with real economic events such as lower accruals quality) are those that relate to more serious, company-level problems for both Sections 302 and 404. Furthermore, the company-level disclosures made under Section 302 seem to be more strongly related to lower accruals quality than the company-wide disclosures under Section 404. The disclosures of material weaknesses that report less serious, account-specific problems under both Sections 302 and 404 do not appear to be effective in our tests at identifying firms with lower financial reporting quality.

Since the implementation of Sections 302 and 404 of Sarbanes-Oxley is fairly new, there are a number of concurrent papers in this area. Our findings are generally consistent with and complementary to these other papers. First, our main finding—that material weaknesses are associated with lower accruals quality—is consistent with several other papers that examine this relation employing varying time periods, accruals quality proxies, and types of deficiencies (Ashbaugh-Skaife et al. 2006; Bedard 2006; Chan et al. 2005; Hogan and Wilkins 2005).[2] Second, our finding that the more auditable account-specific weaknesses are not associated with lower accruals quality is complementary to Hogan and Wilkins (2006) who find that audit fees are abnormally high for firms with an internal control deficiency in the year preceding the deficiency disclosure, indicating that auditors are able to reduce the impact of poor controls through substantive testing. Finally, our conclusion that it is the internal control problem that is the root cause of the lower accruals quality is supported by Ashbaugh-Skaife et al. (2006) and Bedard (2006) who find that accruals quality improves in the year following the reported internal control problem for firms that appear to have remediated their deficiencies.[3] In sum, the papers in this area jointly present a fairly cohesive picture of how internal controls affect accruals quality.

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[2] This finding also complements and motivates recent studies that examine market reactions to these disclosures as well as differences in the implied cost of capital for firms with weak internal controls (e.g., Beneish et al. 2006; DeFranco et al. 2005; Hammersley et al. 2008; Ogneva et al. 2007).

The paper proceeds as follows. The next section motivates our hypotheses, and Section III describes our sample selection and variable definitions. Section IV presents our main results, and Section V describes our robustness tests. A summary and concluding remarks are offered in the final section.

II. HYPOTHESES

Internal control over financial reporting is defined as "a process ... to provide *reasonable assurance* regarding the *reliability* of financial reporting" (PCAOB 2004) (emphasis added). By definition, good internal control is supposed to result in more *reliable* financial information. Internal controls aim to prevent and/or detect errors or fraud that could result in a misstatement of the financial statements. However, there is limited empirical evidence in the existing literature regarding the relation between the quality of internal control and the quality of accounting information.[4] A major reason is lack of data on internal control; in general, it is difficult to directly observe or verify internal control quality (Kinney 2000).

Our sample is generated from the disclosures of material weaknesses in internal controls that first appeared as a result of Section 302 of Sarbanes-Oxley, which requires that officers certify the financial statements, including the effectiveness of the internal control over financial reporting, and any material changes in internal control. Material weaknesses have also been disclosed in conjunction with Section 404 requirements, which became effective for accelerated filers for fiscal years ending after November 15, 2004.[5] Section 404 requires that management issue a report on internal control over financial reporting, and that auditors attest to their findings. The unaudited internal control disclosures under Section 302 are meant to be a transition to the full "attestation" regime under Section 404, with Section 404 becoming the ongoing internal control reporting mechanism. However, as the date for non-accelerated filers to comply with Section 404 has been extended several times (most recently to December 15, 2008 for full attestation), internal control disclosures continue to be reported under Section 302 for these smaller companies. Regardless of the origin of the material weakness disclosure, all else equal, we expect these disclosures to be informative about the quality of firms' accruals.

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[3] Altamuro and Beatty (2006) examine the impact of the FDICIA-mandated internal control reforms within the banking industry and find that these reforms led to improvements in earnings quality for banks affected by the regulation relative to unaffected banks during the same period. Their findings are also consistent with poorer internal control resulting in lower earnings quality.

[4] In related work, Krishnan (2005) finds that internal control problems are negatively associated with the quality of the audit committee. To the extent that audit committee quality and internal control quality are positively associated, this finding supports our hypothesis. As noted in the introduction, there are several concurrent works examining earnings quality and internal control problems (e.g., Ashbaugh-Skaife et al. 2006; Hogan and Wilkins 2005).

[5] Section 302 of the Sarbanes-Oxley Act became effective for fiscal years ending after August 29, 2002 for all SEC registrants. Section 404 became effective for fiscal years ending after November 15, 2004 for accelerated filers, a classification that generally includes public firms with a market capitalization of at least $75 million (the due date was extended an additional 45 days for accelerated filers with a market capitalization of less than $700 million in November 2004). For non-accelerated filers, Section 404 will be effective for years ending on or after December 15, 2007 for management assessment of the effectiveness of internal control and December 15, 2008 for the auditor's attestation report. Since the reporting requirements differ on important dimensions that are likely correlated with accruals quality, we conduct sensitivity analyses that differentiate between Section 302 and 404 disclosures. These alternative results are discussed in Section IV.

Prior research on earnings quality is generally related to accruals quality (Dechow and Schrand 2004), and that is also the focus in this paper. Accruals can be of poor quality for two basic reasons: (1) management could intentionally bias accruals through earnings management and (2) unintentional errors in accrual estimation could occur because it is difficult to predict an uncertain future, or simply because there are insufficient controls in place to detect errors. Both of these roles have been investigated in the existing literature. With respect to earnings management, managers have been shown to use "discretionary accruals" to manage earnings in various settings, such as prior to equity offerings (e.g., Rangan 1998; Teoh et al. 1998). As for unintentional errors, Dechow and Dichev (2002) point out that the quality of accruals and earnings are not limited to managerial opportunism, but are also related to the inherent difficulty in estimating accruals for firms with certain characteristics (e.g., longer operating cycles). They measure the quality of accruals by the extent to which the accruals map into cash flows. In general, they find that the quality of accruals is poorer for firms with certain characteristics, such as a high proportion of losses, more volatile sales and cash flows, lower total assets, and longer operating cycles.

We expect that weaknesses in internal control will result in lower accruals quality because, by definition, they have the potential to allow errors in accrual estimation to occur and impact the reported financial statements. These potential errors include both intentional (earnings management) and unintentional (poor estimation ability) errors. For a company with weak controls, intentionally biased "discretionary" accruals could be greater by failing to limit management's ability to manage earnings (e.g., by segregating duties). Unintentional errors could be higher if weak controls result in more estimation errors for difficult to estimate accruals (e.g., by failing to ensure that qualified personnel are calculating estimates) and allow more procedural errors (e.g., by failing to have appropriate reconciliations and reviews in place). As an example, Cardiodynamic International disclosed a material weakness related to the frequency of their analysis of the inventory obsolescence provision. This material weakness most likely resulted in estimation errors related to its inventory accounts, which may have been intentional to allow the understatement of expenses. These estimation errors, caused by the material weakness in internal control, likely resulted in lower overall accruals quality for Cardiodynamic. This leads to our first hypothesis:

H1: Material weaknesses in internal control are negatively associated with accruals quality.

Our first hypothesis is based on the notion that good internal control over financial reporting is an effective internal monitoring device and results in higher quality financial reporting. However, the hypothesis does not consider external monitors. It is possible that auditors increase substantive testing when encountering weak internal controls. In other words, internal controls and substantive testing could be substitutes in producing high-quality accruals (e.g., Wright and Wright 1996). Our next hypothesis, therefore, is related to the "auditability" or potential severity of the internal control weaknesses.

While a material weakness is the most severe type of internal control deficiency, within the material weakness classification the severity of internal control problems varies substantially. Moody's (the bond-rating company) proposes that material weaknesses fall into one of two categories. Account-specific material weaknesses relate to controls over specific account balances or transaction-level processes. Moody's suggests that these types of material weaknesses are "auditable," and thus do not represent as serious a concern regarding the reliability of the financial statements. Company-level material weaknesses, however, relate to more fundamental problems such as the control environment or the overall financial reporting process, which auditors may not be able to "audit around" effectively. Moody's suggests that company-level material weaknesses call into question not only management's ability to prepare accurate financial reports, but also its ability to control the business (Doss and Jonas 2004).[6] The disclosure by Nitches, Inc., illustrates a typical "company-level" material weakness:

> In October 2004, our management concluded that there were certain material weaknesses in our internal controls and procedures. The material weaknesses noted related to segregation of duties in the payroll process and in the monthly closing process; inadequate review and approval of management-level adjustments and entries. We have discussed these material weaknesses with our auditors, Moss Adams, LLP, who have recommended taking steps to alleviate the inadequate segregation of duties within these areas.

This internal control problem could feasibly affect accruals quality. The lack of proper checks and balances might result in procedural errors, while inadequate review of managerial adjustments might facilitate earnings management. Thus, we expect Nitches to exhibit poorer accruals quality than a similar firm (with respect to size, operating cycle, etc.) without a material weakness in internal control. A seemingly less severe "auditable" material weakness was reported by I-Flow Corporation:

> As part of the annual audit process, a material weakness was identified in our controls related to the application of generally accepted accounting principles, specifically related to the classification of the Company's short-term investments, resulting in the Company reclassifying approximately $34 million of cash and cash equivalents to short-term investments.

It is not clear that this weakness would result in lower accruals quality. The distinction between company-level and account-specific material weaknesses is especially important for the more recent material weakness disclosures in our sample. These disclosures appear to be more conservative, and, per discussions with auditors, might be overly conservative. This leads to our second hypothesis:

> **H2:** Company-level material weaknesses have a stronger negative relation with accruals quality than account-specific material weaknesses.

III. DATA, SAMPLE SELECTION, AND VARIABLE DEFINITIONS

Identifying and Classifying Firms with Material Weaknesses

As mentioned above, material weaknesses in internal control have only been widely disclosed in SEC filings since August 2002. To collect our test firms, we search 10-K Wizard (10-Ks, 10-Qs, and 8-Ks; http://www.10kwizard.com) using the keywords "material weakness" and "material weaknesses" from August 1, 2002 through October 31, 2005.

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[6] It might seem that auditors should also be able to substantively test company-level weaknesses, however, the general nature of these weaknesses does not pinpoint where additional substantive testing should occur, while the account-specific weaknesses highlight a specific area where auditors can then focus more attention.

We include only those firms that classify their internal control problem(s) as a material weakness, the most severe internal control deficiency.[7] We focus on material weaknesses for two reasons. First, it is the most severe type of deficiency in internal control and the most likely to affect accruals quality. Second, the disclosure of material weaknesses is effectively mandatory, while the disclosure of lesser "significant deficiencies" is unambiguously voluntary (see footnote 19). Focusing on the more mandatory disclosures helps avoid self-selection issues associated with voluntary disclosures.

This procedure identifies 1,210 firms that disclosed at least one material weakness from August 2002 to November 2005, outlined in Table 1, Panel A. Of these firms, 164 are not covered by Compustat, and 79 companies in our sample disclosed a material weakness related to lease accounting in 2005. These disclosures were responses to the views expressed by the Office of the Chief Accountant of the SEC in a February 7, 2005 letter to the AICPA. Due to the narrow, technical nature of this issue, we exclude these firms from our analysis (the inclusion of these firms leads to very similar results). If a parent and subsidiary both file with the SEC and report the same material weakness, then we include only the parent company and remove the subsidiary from our control firms if the subsidiary is covered by Compustat (17 firms). We also exclude from our control sample the 100 firms identified by Compliance Week (http://www.complianceweek.com) as having a significant deficiency that does not reach the severity of a material weakness, in order to create a more powerful test between firms with clear internal control problems (firms reporting material weaknesses) and those with no apparent internal control problems. Next, 259 (1,974) of our material weakness (control) sample firms have insufficient data to calculate our measure of accruals quality. We also eliminate three material weakness firms and 14 control firms that were involved in a significant merger (greater than 50 percent of sales) during the accruals quality estimation period, because the merger could result in mismatched current accruals and future cash flows (Hribar and Collins 2002). A significant merger is identified in Compustat footnote 1 as "AB." These restrictions result in a sample of 705 (3,280) material weakness (control) firms with non-missing accruals quality data and 645 (2,943) material weakness (control) firms in our multivariate tests.[8] We summarize our sample selection process in Table 1, Panel A.

We next classify firms as having either a company-level or account-specific material weakness in order to test the hypothesis that more severe, company-level weaknesses will be more negatively associated with accruals quality. We provide examples of each category in Appendix A. These classifications are mutually exclusive; if a firm has both company-level and account-specific weaknesses, then we code the firm as having a company-level material weakness. In some cases, it is straightforward to categorize a disclosure as company-level; for example, when "ineffective control environment" or "management

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[7] A material weakness is "a significant deficiency, or combination of significant deficiencies, that results in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected," as defined by the Public Company Accounting Oversight Board (PCAOB) under Auditing Standard No. 2. A significant deficiency is defined as "a control deficiency, or combination of control deficiencies, that adversely affects the company's ability to initiate, authorize, record, process, or report external financial data reliably in accordance with generally accepted accounting principles such that there is more than a remote likelihood that a misstatement of the company's annual or interim financial statements that is more than inconsequential will not be prevented or detected" (PCAOB 2004, para. 9).

[8] Of the 645 material weakness firms in our final sample, eight were disclosed in 2002, 55 in 2003, 207 in 2004, and the remaining 375 in 2005. Of the 375 disclosures in 2005, 276 (74 percent) correspond to our estimate of 404 filers (a float greater than or equal to $75 million). Only 15 (7 percent) of the disclosures from 2004 correspond to 404 filers (a float of greater than or equal to $75 million and a filing date after November 14, 2004).

TABLE 1
Sample Selection and Variable Definitions

Panel A: Sample Selection

Material Weakness Sample	
Identified material weakness firms from August 2002 to November 2005	1,210
Less firms not covered by Compustat	(164)
Total material weakness firms covered by Compustat	1,046
Less firms with material weaknesses related only to accounting for leases	(79)
Less firms with unavailable data on accruals quality	(259)
Less firms with extreme merger and acquisition activity in the accruals quality estimation period	(3)
Total material weakness firms examined in univariate tests	705
Less firms with unavailable data for control variables	(60)
Total material weakness sample used in multivariate regressions	645

Compustat Control Sample	
All Compustat firms with 2003 data	6,431
Less firms identified as having a material weakness	(1,046)
Less firms identified as having an internal control weakness other than a material weakness by Compliance Week	(100)
Less firms identified as the subsidiary of a material weakness firm	(17)
Less firms with unavailable data on accruals quality	(1,974)
Less firms with extreme merger and acquisition activity in the accruals quality estimation period	(14)
Total control firms examined in univariate tests	3,280
Less firms with unavailable data for control variables	(337)
Total control sample used in multivariate regressions	2,943

Panel B: Variable Definitions

Variable	Definition
Material Weakness Disclosures	
MW	An indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and 0 otherwise.
MW_Account-Specific (Company-Level)	An indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005) related to an auditable account (a more pervasive company-wide problem), and 0 otherwise.
Accruals Quality Measures	
Accruals Quality (AQ)	The standard deviation of the residuals from the Dechow and Dichev (2002) accruals quality measure, as adjusted by McNichols (2002) and Francis et al. (2005), measured from 1996–2002 (see Section III).
Discretionary Accruals	The average of the absolute value of discretionary accruals from 1996–2002, where discretionary accruals are calculated following Becker et al. (1998).
Average Accruals Quality	The average of the absolute value of the residuals from the Dechow and Dichev (2002) accruals quality measure, as adjusted by McNichols (2002) and Francis et al. (2005), measured from 1996–2002.

(*continued on next page*)

TABLE 1 (continued)

Variable	Definition
Historical Restatement	An indicator variable that is equal to 1 if the firm was listed by the GAO as having restated their financial statements from 1997–2002, and 0 otherwise.
Earnings Persistence	The coefficient on earnings from a cross-sectional regression of current earnings on one-year-ahead earnings estimated from 1996–2002.
Innate Firm Characteristics That Affect Accruals Quality	
Loss Proportion	The ratio of the number of years of losses (Compustat annual data item #123) relative to the total number of years of data from 1996–2002.
Sales Volatility	The standard deviation of sales (data item #12), scaled by average assets (data item #6), from 1996–2002.
CFO Volatility	The standard deviation of cash from operations (data item #308), scaled by average assets, from 1996–2002.
Total Assets	The log of total assets (data item #6) from 2003 Compustat.
Operating Cycle	The log of the average of [(Sales/360)/(Average Accounts Receivable) + (Cost of Goods Sold/360)/Average Inventory)], calculated from 1996–2002.
Additional Material Weakness Determinants That Could Be Related To Accruals Quality	
Firm Age	The log of the number of years the firm has CRSP data as of 2003.
Segments	The log of the sum of the number of operating and geographic segments reported by the Compustat Segments database for the firm in 2003.
Extreme Sales Growth	An indicator variable that is equal to 1 if year-over-year industry-adjusted sales growth (data item #12) from 2002 to 2003 falls into the top quintile, and 0 otherwise.
Restructuring Charge	The aggregate restructuring charges [data item #376 × (−1)] in 2003 and 2002, scaled by the firm's 2003 market capitalization.

override" is specifically identified as a material weakness in the disclosure. However, most disclosures are not so forthcoming. Thus, if a firm has material weaknesses related to at least three account-specific problems, we classify the firm as having a company-level material weakness. In two cases, the firm has insufficient information to code the disclosure; we classify both of these disclosures as company-level. Of our 705 firms with non-missing accruals quality data, 426 are classified as account-specific and 279 as company-level.

Accruals Quality Measures

We use the measure of accrual estimation error developed in Dechow and Dichev (2002) and modified in McNichols (2002) and Francis et al. (2005) as our main measure of accruals quality. This measure defines the quality of accruals as the extent to which they map into past, current, and future cash flows. We assume that this measure can capture the effect of internal control on accruals quality for two reasons. First, a large number of disclosed material weaknesses are related to specific accounts (e.g., inventory [Ge and McVay 2005]). These specific accounts could have estimation errors that will be captured by this measure. For example, if the inventory account is overstated, then the obsolete inventory will not result in cash inflows in the next period, resulting in a low correlation between the accrual and realized cash flows. Second, compared to other measures of accruals quality, the measure in Dechow and Dichev (2002) does not rely solely on earnings management or assumptions related to market efficiency (e.g., value-relevance). This measure can capture both biased "discretionary" accruals and unintentionally poorly estimated accruals, which we predict will be the result of an internal control system with material weaknesses.[9]

Specifically, the proxy for accruals quality is measured by estimating the following regression by industry and year:

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 \Delta REV_t + \beta_5 PPE_t + \varepsilon_t. \quad (1)$$

The residuals from the regression measure the extent to which current accruals (ΔWC) do not effectively map into past, present, or future cash flows (CFO).[10] Following both McNichols (2002) and Francis et al. (2005), we also include the current year change in sales ($\Delta REV = \Delta$(data item 12)) and the current year level of property, plant, and equipment (PPE = data item 7) in Equation (1). The inclusion of these two variables links the Dechow and Dichev (2002) measure to the Jones (1991) model of discretionary accruals.

Following Francis et al. (2005), we estimate the above regression cross-sectionally, by year, within each of the 48 Fama and French (1997) industry classifications. If an industry group has fewer than 20 observations in any given year, then those observations pertaining to that industry are deleted. We use annual Compustat data spanning 1995–2003, which results in seven years of observations (1996–2002), since the regression requires data from the past and future years. We then aggregate the residuals by firm and calculate the standard deviation of residuals (AQ), by firm, requiring a minimum of four years of data out of the seven years. A higher standard deviation indicates lower accruals quality.

As with any proxy, our measure of accruals quality has limitations. As noted in McNichols (2002), the Dechow and Dichev (2002) approach limits the applicability of the model to accruals that are short term in nature (i.e., working capital accruals). In addition, the definition of accruals quality is symmetric for estimation errors that overstate and understate cash flow realizations by an equal amount, which may be problematic in certain settings, although less of a concern in our setting as unintentional errors are not expected to be systematically over- or understated. Moreover, a sizable fraction of the explanatory power of the measure is attributable to the negative contemporaneous association between accruals and cash flows. To the extent that this contemporaneous component does not capture accruals quality, it can handicap the ability of the Dechow and Dichev (2002) model to capture accruals quality (Wysocki 2006). Finally, as with any measure, to the extent that we do not properly control for the joint determinants of both accruals quality and material weaknesses, our conclusions would not be warranted.

In order to further validate our results and to enhance comparison with other research on earnings quality, we also examine four additional proxies of earnings/accruals quality.

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[9] Roychowdhury (2006), among others, shows that firms appear to manipulate real operating activities in order to "manage" earnings. However, such an action is not a violation of generally accepted accounting principles, and thus we do not expect good internal control to constrain this behavior.

[10] We define the change in working capital accruals from year $t-1$ to t as ΔWC = ΔAccounts Receivable + ΔInventory − ΔAccounts Payable − ΔTaxes Payable + ΔOther Assets, or ΔWC = −(data item 302 + data item 303 + data item 304 + data item 305 + data item 307). CFO is cash flow from operations (data item 308). All variables in Equation (1) are scaled by average total assets (data item 6) and winsorized at the 1st and 99th percentiles, by year.

The first is *Discretionary Accruals*, which is the average of the absolute value of discretionary accruals, estimated following Becker et al. (1998) and Kothari et al. (2005).[11] Our second alternative proxy, *Average Accruals Quality*, is suggested in Dechow and Dichev (2002). This measure, the average of the absolute value of the firm residuals from Equation (1), is estimated in the cross-section and is highly correlated with our main accruals quality measure (the standard deviation of the residuals). The third alternative proxy of accruals quality is *Historical Restatement*, which is an indicator variable that is equal to 1 if the firm was listed by the General Accounting Office (GAO) as having had a restatement from January 1997 through December 2002. Intuitively, in order for a restatement to occur, an error (either intentional or unintentional) must have been made. Therefore, while our Dechow and Dichev (2002) measure attempts to capture these errors through the realization of cash flows, restatements provide explicit evidence of these errors.[12] Our final alternative measure of accruals quality is *Earnings Persistence* (Dechow and Dichev 2002; Schipper and Vincent 2003). These four alternative measures are defined in Table 1, Panel B.

Timing of the Measurement of Accruals Quality

Since internal control disclosures were not widely available prior to the Sarbanes-Oxley Act of 2002, it is difficult to determine how long the newly disclosed weaknesses have existed in the company. This has implications for the time period over which we measure our accruals quality variable. In our paper, we assume that the weaknesses, on average, have existed several years prior to their disclosure, if not since the firm's inception. Each of our proxies for accruals quality is measured from 1996 to 2002, which results in almost no overlap with the financial periods in which the weaknesses were reported. We can infer from the descriptions that many of the disclosures have been around for some time. For example, 3D Systems had the following disclosure:

> Specifically, our revenue recognition policies and procedures were poorly documented and not readily accessible to most of our employees. Our documentation for machine sales transactions was inconsistent and not adequately defined. Furthermore, the then existing policies and procedures [were] broad-based, and did not include specific procedures and controls by department or function. Moreover, our accounting and finance staff were inadequate to meet the needs of an international public company.

It seems unlikely that 3D Systems did not have these problems in the recent years preceding the disclosure. Rather, it seems likely that Sarbanes-Oxley led to the disclosure of a situation that had existed for some time. As another example, Sonix Research Inc., reported the following:

> Due to its small size and limited financial resources, however, the Company's chief financial officer, a member of management, has been the only employee involved in

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[11] Discretionary accruals are estimated using the following OLS regression: $Total\ Accruals_t/Total\ Assets_{t-1} = \beta_0 + \beta_1(1/Total\ Assets_{t-1}) + \beta_2\ (\Delta Revenue_t/Total\ Assets_{t-1}) + \beta_3(PPE_t/Total\ Assets_{t-1}) + \varepsilon_t$. *Total Accruals* are calculated as the difference between income before extraordinary items (Compustat item 123) and operating cash flows (Compustat item 308). We estimate the above regression by two-digit SIC code, requiring at least 20 observations in each industry group. Our main tests present the Becker et al. (1998) specification. We also consider the performance-adjusted discretionary accruals prescribed by Kothari et al. (2005) as a robustness check.

[12] It is possible that the causality is reversed. Ashbaugh-Skaife et al. (2007) suggest that a recent restatement results in increased auditor and regulator scrutiny, which may result in additional search procedures or increase the likelihood of a voluntary disclosure of a significant deficiency.

> accounting and financial reporting. The Board of Directors has recognized that as a result, there is no segregation of duties within the accounting function, leaving all aspects of financial reporting and physical control of cash and equivalents in the hands of the same employee. Usually, this lack of segregation of duties represents a material weakness in a company's internal control over financial reporting; however, based on the demonstrated integrity and trustworthiness of the Company's chief financial officer, the Board of Directors has had confidence that there have been no irregularities in the Company's financial reporting or in the protection of its assets.

The above condition has probably existed since the firm's inception. Clearly, not all the material weakness disclosures are long-standing; however, in our study we operate under the assumption that, on average, these problems have been around for multiple years, and measure our accruals quality proxies over the preceding seven years (1996–2002).

An alternative approach is to measure accruals quality in the same period that the material weakness was reported. We choose not to use this approach because the impending disclosure of an internal control weakness may cause management and/or the auditor to intensify their search for misestimated accruals, resulting in more write-downs and thereby lower accruals quality (Hogan and Wilkins 2005). If these low-quality accruals do not result from the company's poor internal controls per se, then a lower concurrent accruals quality measure could be misattributed to the control system. Our use of an accruals quality measure that is calculated in the periods preceding the material weakness disclosure helps to address this competing explanation that auditors applied additional scrutiny and conservatism to the firms that they knew would be publicly disclosing their internal control problems.

Innate Firm Characteristics that Affect the Quality of Accruals

Dechow and Dichev (2002) find that accruals quality is poorer for firms with certain characteristics, such as for smaller firms. We expect that internal control weaknesses will reduce accruals quality *beyond* that explained by these innate firm characteristics. While Dechow and Dichev (2002) find that smaller firms tend to have lower quality accruals, we expect that, for two equally small firms, the company with weak internal controls will have lower accruals quality. For this reason, we include these five innate firm variables as controls in our analysis: *Loss Proportion*, *Sales Volatility*, *Cash Flow (CFO) Volatility*, *Total Assets*, and *Operating Cycle*, as our focus on the effect of the internal control problem, rather than generic volatility or a firm's operating cycle (see Table 1, Panel B for variable definitions).

Prior research has also identified determinants of material weaknesses in internal control. Material weakness firms tend to be less profitable, smaller, younger, more complex, growing rapidly, or undergoing restructuring (e.g., Krishnan 2005; Ge and McVay 2005; Ashbaugh-Skaife et al. 2007; Doyle et al. 2007).[13] As these characteristics may have a direct effect on accruals quality, we include one proxy for each of these constructs in our main regressions as follows: the size of the firm (*Total Assets*), the age of the firm (*Firm Age*), profitability (*Loss Proportion*), the complexity of the firm's operations (*Segments*), rapid growth (*Extreme Sales Growth*), and restructurings (*Restructuring Charge*); see Table 1, Panel B for definitions.

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[13] Krishnan (2005) finds that internal control problems and audit committee quality are negatively associated. We examine this variable in a sensitivity analysis in Section V; our results are not sensitive to its inclusion.

IV. RESULTS

Descriptive Statistics and Univariate Analysis

Table 2, Panel A presents descriptive statistics for our sample of firms reporting material weaknesses. As our comparison group, we present all 2003 Compustat firms that were not identified as having an internal control deficiency and do not have missing data for our accruals quality measure; we report the results of a difference in means under a two-tailed t-test for each of the variables. Turning first to *Accruals Quality* (*AQ*), a higher *AQ* indicates a higher standard deviation of residuals, and thus lower accruals quality. The mean of *AQ* is higher for the material weakness firms compared to the control sample (0.070 versus 0.057; p-value of 0.001), providing initial support for H1. This univariate result extends to each of our proxies for accruals quality. The average absolute value of discretionary accruals is significantly higher for material weakness firms (0.166 versus 0.133; p-value of 0.001), and their proportion of historical accounting restatements is also higher (0.139 versus 0.092; p-value of 0.001). Finally, earnings persistence is lower for the material weakness firms (0.697 versus 0.736; p-value < 0.001 under an F-test).

Overall, the univariate results support H1; however, as noted above, we expect material weakness firms to also have lower *innate* accruals quality, an expectation supported by Table 2, Panel A. Material weakness firms have more losses, have higher sales and cash flow volatility, and are smaller than the control firms. In addition, in results measured from 1996 through 2002 (scaled by average total assets and not tabulated), material weakness firms have lower average cash flows from operations (-0.012 versus 0.020) and lower average earnings before extraordinary items (-0.100 versus -0.063), but higher average working capital accruals (0.072 versus 0.057). Since the material weakness firms tend to be more volatile and in worse financial condition, it is vital to control for these innate characteristics in our multivariate tests.[14]

In Table 2, Panel B we compare account-specific material weakness firms to company-level material weakness firms. *AQ* is significantly higher for firms that disclose company-level material weaknesses than for firms that disclose account-specific material weaknesses (mean of 0.080 versus 0.063). *Discretionary Accruals* (0.191 versus 0.149), *Average Accruals Quality* (0.069 versus 0.056), and *Historical Restatement* (0.183 versus 0.110) are all higher for the company-level weakness firms as well. Finally, *Earnings Persistence* is lower for the company-level group at 0.668 versus 0.728. Overall, the univariate results seem to provide initial support for H2; firms with company-level weaknesses have lower accruals quality than firms with account-specific weaknesses. The innate variables associated with lower accruals quality also tend to be higher for the company-level disclosure firms, supporting the need for these control variables when testing H2. For example, firms with company-level disclosures tend to have more losses and greater sales and cash flow volatility compared to their account-specific counterparts. They also have lower average cash flows and earnings before extraordinary items, and higher working capital accruals (not tabulated). Account-specific disclosure firms tend to be slightly larger and older and have more segments than company-level disclosure firms, consistent with the notion that the additional complexity associated with size and decentralization creates unique challenges for these firms (Doyle et al. 2007).

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[14] Interestingly, while the bulk of the determinants of material weaknesses in internal control are consistent with prior literature, our sample does not exhibit univariate differences for rapid growth. Upon further inspection, this difference is a function of our stringent data requirements to calculate accruals quality; if the means are compared before requiring accruals quality data, then results are consistent with prior research.

TABLE 2
Descriptive Statistics

Panel A: Descriptive Statistics of Material Weakness Firms versus 2003 Compustat Firms

	Material Weakness Firms			2003 Compustat Firms (Excluding Material Weakness Firms)		t-test of Mean Differences
Variable	**Mean**	**Median**	**Predicted Difference**	**Mean**	**Median**	**Two-tailed p-value**
Accruals Quality	0.070	0.055	>	0.057	0.042	0.001
Discretionary Accruals	0.166	0.114	>	0.133	0.092	0.001
Average Accruals Quality	0.061	0.048	>	0.049	0.037	0.001
Historical Restatement	0.139	0.000	>	0.092	0.000	0.001
Earnings Persistence	0.697	NA	<	0.736	NA	0.001
Loss Proportion	0.430	0.429		0.343	0.250	0.001
Sales Volatility	0.291	0.222		0.239	0.170	0.001
CFO Volatility	0.113	0.079		0.098	0.064	0.001
Total Assets (in millions)	2,097.070	197.336		3,652.640	290.157	0.001
Operating Cycle	147.539	115.301		144.209	111.400	0.544
Firm Age	16.496	11.000		19.220	14.000	0.001
Segments	4.982	4.000		4.658	4.000	0.005
Extreme Sales Growth	0.179	0.000		0.179	0.000	0.993
Restructuring Charge	0.040	0.000		0.019	0.000	0.001

Panel B: Descriptive Statistics of Account-Specific versus Company-Level Material Weakness Firms

	Account-Specific Material Weakness Firms			Company-Level Material Weakness Firms		t-test of Mean Differences
Variable	**Mean**	**Median**	**Predicted Difference**	**Mean**	**Median**	**Two-tailed p-value**
Accruals Quality	0.063	0.052	<	0.080	0.062	0.001
Discretionary Accruals	0.149	0.106	<	0.191	0.124	0.003
Average Accruals Quality	0.056	0.044	<	0.069	0.057	0.001
Historical Restatement	0.110	0.000	<	0.183	0.000	0.009
Earnings Persistence	0.728	NA	>	0.668	NA	0.001
Loss Proportion	0.387	0.286		0.495	0.429	0.001
Sales Volatility	0.272	0.211		0.320	0.235	0.017
CFO Volatility	0.103	0.071		0.129	0.092	0.003
Total Assets (in millions)	2,457.460	248.471		1,546.800	130.071	0.151
Operating Cycle	145.683	114.359		150.382	116.420	0.645
Firm Age	17.498	12.000		14.931	11.000	0.008
Segments	5.127	5.000		4.760	4.000	0.075
Extreme Sales Growth	0.193	0.000		0.159	0.000	0.243
Restructuring Charge	0.038	0.000		0.042	0.000	0.659

(*continued on next page*)

TABLE 2 (continued)

In this table, we present the untransformed values (rather than the natural log) of *Total Assets, Operating Cycle, Firm Age*, and *Segments* for ease of interpretation. The t-test results for the logged values are similar, except for *Total Assets* in Panel B, where the log of *Total Assets* is significantly smaller for the company-level material weakness firms. The t-test of means uses the pooled method when the underlying variances are equal and the Satterthwaite method when they are unequal. The test on *Earnings Persistence* is an F-test on the difference in incremental power of *the Earnings* × *MW_Account-Specific* and *Earnings* × *MW_Company-Level* interaction coefficients.

In Panel A, for the *Accruals Quality* t-test there are 705 material weakness firm observations (from August 2002 to November 2005) and 3,280 control firm observations (see Table 1, Panel A).

In Panel B, for the *Accruals Quality* t-test there are 426 account-specific material weakness firm observations and 279 company-level observations.

For both Panels A and B, for the other four accruals quality proxies the sample requirement is the number of observations with data for the particular accruals quality metric. For the control variables, the sample requirement is to have sufficient data to calculate *Accruals Quality*.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All variables are described in Table 1, Panel B.

Turning to Table 3, which presents a correlation matrix for the main variables, material weakness firms are positively correlated with most of the innate characteristics of firms with poor accruals quality identified in Dechow and Dichev (2002). Material weakness disclosures are positively associated with a higher proportion of losses, higher cash flow and sales volatility, and longer operating cycles, which raises the possibility that these innate firm characteristics are driving the lower accruals quality, and not the material weaknesses per se. Our multivariate analyses below investigate our hypotheses further.[15]

Multivariate Analysis of Accruals Quality and Material Weaknesses

The first column of results in Table 4 contains the regression estimates of accruals quality on an indicator variable, material weakness (*MW*), where *MW* is equal to 1 if the firm reports a material weakness, and 0 if the firm is in the control group. We present our primary accruals quality measure (*AQ*) as the dependent variable (recall that a higher value represents lower accruals quality) and control for the innate firm characteristics related to accruals quality as well as the determinants of material weaknesses. As noted above, we include only one proxy for each of the determinants of material weaknesses for succinctness. Results are not sensitive to the inclusion of the comprehensive list of variables; the coefficient on *MW* is 0.004 with a p-value of 0.003 when all variables are included.

Our main variable of interest, *MW*, is positively related to the accruals quality measure (t-statistic = 2.51), supporting H1 and suggesting material weakness firms have poorer accruals quality. The economic magnitude of the coefficient on *MW* ($\alpha = 0.004$) is also significant. For the typical control firm (median *Accruals Quality* of 0.042 from Table 2, Panel A) a switch from *MW* = 0 to *MW* = 1 results in a 9.5 percent (0.004 divided by 0.042) increase in the accruals quality metric (implying poorer accruals quality), after controlling for other known determinants of accruals quality. Turning to our control variables, each of the variables measuring innate firm characteristics that are expected to affect accruals quality is significant in the predicted direction (Dechow and Dichev 2002). Finally,

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[15] As several of our variables are correlated at 0.40 or more, we examine the variance inflation factors (VIFs) for each of our multivariate regressions below to help ensure that multicollinearity is not a major concern. None of our calculated VIFs exceed 2, which is well below the level indicating harmful multicollinearity (Kennedy 1998, 190).

TABLE 3
Spearman/Pearson Correlation Matrix

	MW	*AQ*	*Disc. Accruals*	*Loss Proportion*	*Sales Volatility*	*CFO Volatility*	*Total Assets*	*Operating Cycle*	*Firm Age*	*Segments*	*Extreme Sales Growth*	*Restructuring Charge*
MW		0.091 (0.0001)	0.082 (0.0001)	0.093 (0.0001)	0.087 (0.0001)	0.053 (0.0007)	−0.049 (0.0019)	0.025 (0.1135)	−0.081 (0.0001)	0.063 (0.0001)	0.000 (0.9925)	0.090 (0.0001)
AQ	0.113 (0.0001)		0.580 (0.0001)	0.457 (0.0001)	0.479 (0.0001)	0.697 (0.0001)	−0.551 (0.0001)	0.119 (0.0001)	−0.270 (0.0001)	−0.209 (0.0001)	0.127 (0.0001)	0.013 (0.4137)
Discretionary Accruals	0.113 (0.0001)	0.675 (0.0001)		0.455 (0.0001)	−0.138 (0.0001)	−0.127 (0.0001)	−0.405 (0.0001)	0.045 (0.0001)	−0.352 (0.0001)	−0.158 (0.0001)	0.118 (0.0001)	0.061 (0.0002)
Loss Proportion	0.107 (0.0001)	0.486 (0.0001)	0.520 (0.0001)		0.245 (0.0001)	0.535 (0.0001)	−0.524 (0.0001)	0.073 (0.0001)	−0.413 (0.0001)	−0.242 (0.0001)	0.129 (0.0001)	0.125 (0.0001)
Sales Volatility	0.093 (0.0001)	0.539 (0.0001)	−0.388 (0.0001)	0.286 (0.0001)		0.416 (0.0001)	−0.373 (0.0001)	−0.095 (0.0001)	−0.199 (0.0001)	−0.114 (0.0001)	0.067 (0.0001)	0.052 (0.0013)
CFO Volatility	0.083 (0.0001)	0.757 (0.0001)	−0.345 (0.0001)	0.567 (0.0001)	0.529 (0.0001)		−0.540 (0.0001)	0.112 (0.0001)	−0.298 (0.0001)	−0.258 (0.0001)	0.184 (0.0001)	−0.005 (0.7457)
Total Assets	−0.053 (0.0008)	−0.595 (0.0001)	−0.517 (0.0001)	−0.522 (0.0001)	−0.403 (0.0001)	−0.614 (0.0001)		−0.097 (0.0001)	0.304 (0.0001)	0.416 (0.0001)	−0.096 (0.0001)	0.039 (0.0174)
Operating Cycle	0.026 (0.1024)	0.192 (0.0001)	0.121 (0.0001)	0.092 (0.0001)	−0.051 (0.0014)	0.146 (0.0001)	−0.159 (0.0001)		0.001 (0.9387)	0.109 (0.0001)	0.098 (0.0001)	−0.009 (0.5648)
Firm Age	−0.080 (0.0001)	−0.312 (0.0001)	−0.448 (0.0001)	−0.393 (0.0001)	−0.190 (0.0001)	−0.367 (0.0001)	0.294 (0.0001)	0.016 (0.3369)		0.191 (0.0001)	−0.101 (0.0001)	−0.041 (0.0128)
Segments	0.066 (0.0001)	−0.194 (0.0001)	−0.161 (0.0001)	−0.223 (0.0001)	−0.077 (0.0001)	−0.251 (0.0001)	0.402 (0.0001)	0.133 (0.0001)	0.186 (0.0001)		−0.042 (0.0085)	0.042 (0.0100)
Extreme Sales Growth	0.000 (0.9925)	0.112 (0.0001)	0.109 (0.0001)	0.116 (0.0001)	0.059 (0.0002)	0.166 (0.0001)	−0.090 (0.0001)	0.092 (0.0001)	−0.100 (0.0001)	−0.040 (0.0109)		−0.081 (0.0001)
Restructuring Charge	0.056 (0.0005)	−0.005 (0.0001)	0.030 (0.063)	0.111 (0.0001)	0.041 (0.0114)	−0.015 (0.3729)	0.176 (0.0001)	0.032 (0.0473)	−0.031 (0.0624)	0.221 (0.0001)	−0.093 (0.0001)	

Pearson correlations are reported above the diagonal, and Spearman correlations are reported below.
Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.
All variables are described in Table 1, Panel B.

TABLE 4
Accruals Quality and Material Weaknesses

		Dependent Variable = *Accruals Quality* (*AQ*)	
Independent Variables	**Predicted Sign**	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**
Intercept		0.026	0.026
		(5.22[a])	(5.21[a])
MW	+	0.004	
		(2.51[b])	
MW_Account-Specific	+		0.002
			(0.94)
MW_Company-Level	+		0.007
			(3.09[a])
Loss Proportion	+	0.006	0.006
		(2.93[a])	(2.89[a])
Sales Volatility	+	0.047	0.047
		(16.13[a])	(16.12[a])
CFO Volatility	+	0.233	0.233
		(31.78[a])	(31.78[a])
Total Assets	−	−0.004	−0.004
		(−12.28[a])	(−12.22[a])
Operating Cycle	+	0.004	0.004
		(5.26[a])	(5.23[a])
Firm Age		−0.001	−0.001
		(−1.11)	(−1.08)
Segments		0.002	0.002
		(1.80[c])	(1.79[c])
Extreme Sales Growth		0.000	0.000
		(0.05)	(0.13)
Restructuring Charge		0.001	0.001
		(0.21)	(0.21)
Number of Material Weakness Obs.		645	645
Number of Total Obs.		3,588	3,588
Adjusted R^2		54.82%	54.85%

[a,b,c] Significant at a two-tailed p-value ≤ 0.01, 0.05, or 0.10, respectively.
Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.
All variables are defined in Table 1, Panel B.

the additional controls we identified through our examination of the internal control literature are largely insignificant.

We next examine the relation between accruals quality and the different types of internal control deficiencies. Hypothesis 2 predicts that company-level material weaknesses will have a stronger association with accruals quality than will account-specific material weaknesses, since company-level internal control deficiencies are less "auditable" and thus more likely to result in erroneous accruals in the filed financial statements. As in our earlier tests, we control for the innate firm characteristics that proxy for the inherent difficulty in accrual estimation and the determinants of material weaknesses.

Referring to the second column of results in Table 4, account-specific material weaknesses are not significantly associated with accruals quality (t-statistic = 0.94) while company-level material weaknesses are positively related to *AQ* (t-statistic = 3.09). Consistent with H2, the magnitude of the coefficient on account-specific weaknesses ($\alpha = 0.002$) is significantly lower than the magnitude of the coefficient on company-level weaknesses ($\alpha = 0.007$) under an F-test ($p = 0.057$, two-tailed). Economically speaking, the presence of a company-level (account-specific) material weakness is expected to result in an AQ that is 16.7 (4.8) percent larger than the control firms.

Our finding that account-specific internal control problems are not significantly associated with lower accruals quality complements Hogan and Wilkins (2006), who find that auditor fees were significantly higher for material weakness firms in the year prior to the disclosure of a significant deficiency. Thus, our combined results are consistent with auditors historically "auditing around" the account-specific internal control problems, thereby mitigating the negative impact on accruals quality.

Multivariate Analysis of Additional Accruals Quality Variables

In Table 5, we replicate our main results for our four additional measures of accruals quality. Referring to the first column of results in Table 5, consistent with Ashbaugh-Skaife et al. (2006), material weakness disclosures are positively associated with *Discretionary Accruals* (t-statistic = 1.89).[16] We parse out account-specific and company-level problems in the second column of results. While the coefficient on company-level problems appears to be larger in magnitude than that on account-specific weaknesses, consistent with our main results, the coefficients are not significantly different from one another under an F-test ($p = 0.410$, two-tailed).

Our second alternative proxy, *Average Accruals Quality*, is presented in the third and fourth columns of results in Table 5. Given the fact that this variable is highly correlated with our primary accruals quality measure, it is not surprising that the results are very similar to those shown in Table 4 and continue to support H1 and H2; the coefficients on account-specific and company-level weaknesses are significantly different under an F-test ($p = 0.063$, two-tailed).

In the third set of columns in Table 5 we present the estimates from a logistic regression, where *Historical Restatement* is equal to 1 if the company had a restatement from 1997–2002. The coefficient on *MW* is positive and significant ($\chi^2 = 12.21$), and the breakdown by type is consistent with the results above—the lower accruals quality is driven by company-level weaknesses. The difference between the coefficients is statistically significant under an F-test ($p = 0.008$, two-tailed).

Our final alternative measure of accruals quality is *Earnings Persistence*, presented in the final two columns in Table 5. We interact *MW* with *Earnings* (Compustat data item #123 scaled by average total assets) to evaluate the incremental persistence of material weakness firms for 2002. The interaction term on *MW* is negative and significant (−0.067; t-statistic = 2.73), suggesting again that the earnings/accruals quality of material weakness firms is poorer than that of our control firms. Finally, referring to the final column of results, *MW* is only negatively related to earnings persistence for company-level weaknesses, and this coefficient is statistically different from that on account-specific weaknesses under an F-test ($p = 0.001$, two-tailed).

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[16] The results remain similar if we use performance-matched discretionary accruals ($t = 1.82$) following Kothari et al. (2005).

TABLE 5
Alternative Measures of Accruals Quality and Material Weaknesses

Dependent Variable:		*Discretionary Accruals*		*Average Accruals Quality*		*Historical Restatement*		*Future Earnings* (Persistence)	
Independent Variables	**Predicted Sign**	**Coefficient Estimate (t-statistic)**		**Coefficient Estimate (t-statistic)**		**Coefficient Estimate (χ^2)**		**Coefficient Estimate (t-statistic)**	
Intercept		0.302	0.301	0.028	0.028	−4.118	−4.132	0.065	0.058
		(17.03^{a})	(17.01^{a})	(6.32^{a})	(6.32^{a})	(90.25^{a})	(90.51^{a})	(2.43^{b})	(2.17^{b})
MW	+^{d}	0.011		0.005		0.433		−0.018	
		(1.89^{c})		(3.66^{a})		(12.21^{a})		(−1.88^{c})	
MW_Account-Specific	?		0.006		0.003		0.177		−0.004
			(0.82)		(1.91^{c})		(1.16)		(−0.31)
MW_Company-Level	+		0.018		0.008		0.748		−0.031
			(2.17^{b})		(3.83^{a})		(20.58^{a})		(−2.15^{b})
Earnings								0.647	0.654
								(45.30^{a})	(46.28^{a})
Earnings × MW	−							−0.067	
								(−2.73^{a})	
Earnings MW_ Account-Specific	?								0.262
									(6.47^{a})
Earnings MW_ Company-Level	−								−0.207
									(−7.30^{a})
Loss Proportion		0.102	0.101	0.001	0.001	0.432	0.415	−0.067	−0.058
		(13.36^{a})	(13.33^{a})	(0.63)	(0.59)	(4.49^{b})	(4.14^{b})	(−4.87^{a})	(−4.29^{a})
Sales Volatility		0.000	0.000	0.040	0.040	0.600	0.606	0.090	0.085
		(1.60)	(1.56)	(16.00^{a})	(15.99^{a})	(6.79^{a})	(6.87^{a})	(5.66^{a})	(5.39^{a})

(*continued on next page*)

TABLE 5 (continued)

Dependent Variable:		*Discretionary Accruals*		*Average Accruals Quality*		*Historical Restatement*		*Future Earnings* (Persistence)	
Independent Variables	**Predicted Sign**	**Coefficient Estimate (t-statistic)**		**Coefficient Estimate (t-statistic)**		**Coefficient Estimate (χ^2)**		**Coefficient Estimate (t-statistic)**	
CFO Volatility		0.000 (4.14^{a})	0.000 (4.16^{a})	0.178 (27.85^{a})	0.178 (27.84^{a})	−0.62 (0.011)	−0.088 (0.02)	−0.429 (−10.60^{a})	−0.419 (−10.48^{a})
Total Assets		−0.019 (−14.31^{a})	−0.019 (−14.25^{a})	−0.003 (−11.22^{a})	−0.003 (−11.16^{a})	0.085 (8.31^{a})	0.086 (8.64^{a})	0.004 (2.24^{b})	0.004 (2.30^{b})
Operating Cycle		−0.002 (−0.88)	−0.002 (−0.90)	0.004 (6.27^{a})	0.004 (6.25^{a})	0.046 (0.52)	0.045 (0.50)	−0.006 (−1.49)	−0.004 (−1.15)
Firm Age		−0.040 (−11.74^{a})	−0.040 (−11.71^{a})	−0.003 (−3.48^{a})	−0.003 (−3.45^{a})	0.178 (5.62^{b})	0.182 (5.89^{b})	−0.010 (−2.15^{b})	−0.011 (−2.29^{b})
Segments		0.008 (1.94^{c})	0.009 (1.93^{c})	0.001 (0.97)	0.001 (0.95)	0.279 (7.09^{a})	0.279 (7.03^{a})	0.000 (0.01)	−0.000 (−0.03)
Extreme Sales Growth		0.020 (3.56^{a})	0.020 (3.61^{a})	0.002 (1.49)	0.002 (1.57)	−0.566 (12.99^{a})	−0.554 (12.38^{a})	0.043 (5.01^{a})	0.043 (5.01^{a})
Restructuring Charge		0.053 (2.14^{b})	0.052 (2.12^{b})	−0.002 (−0.36)	−0.002 (−0.36)	1.023 (4.75^{b})	1.017 (4.68^{b})	−0.049 (−1.20)	−0.032 (−0.80)
Number of Material Weakness Obs.		650	650	645	645	757	757	716	716
Number of Total Obs.		3,581	3,581	3,588	3,588	4,289	4,289	4,149	4,149
Adjusted R^2/Pseudo R^2		27.69%	27.69%	50.15%	50.19%	4.01%	4.35%	59.50%	60.46%

[a,b,c] Significant at a two-tailed p-value ≤ 0.01, 0.05, or 0.10, respectively.

[d] Note that the main effect of *MW* has no prediction when the dependent variable is *Future Earnings*. For this model, the variable of interest is the interaction between *Earnings* and *MW*.

Earnings = earnings before extraordinary items (data item 123); and

Future Earnings = one-year-ahead earnings.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All other variables are defined in Table 1, Panel B.

Overall, the multivariate results support the notion that accruals quality is lower when a firm has a weak internal control system (H1) and that this relation is stronger when the internal control problem is at the company-level (H2). These results are consistent across the different proxies for accruals quality.

Analysis by Reporting Regime

As mentioned earlier, material weakness disclosures under Section 404 are likely to be different than those under Section 302. In this section, we investigate how these differences affect our study. In Table 6, we re-estimate our regressions separately for the 302 and 404 subgroups. The coefficients on the *MW* variable (t-statistic = 3.22) and the company-level variable (t-statistic = 3.73) are strongly positive for 302 reporters, consistent with the full-sample results. For Section 404 filers, the results are similar, but quite a bit weaker. The main driver of lower accruals quality, company-wide material weaknesses, is still significant (t-statistic = 2.00), but the coefficient value for Section 404 (0.005) is about half of the coefficient for Section 302 (0.011). This reduced effect translates into an overall coefficient on the *MW* variable that is now insignificant for the average Section 404 material weakness disclosure (t-statistic = 0.95).[17]

There are several possible explanations for the weaker results for the Section 404 subgroup. First, the increased scrutiny of a full Section 404 audit and the fact that the external auditor must sign off on an opinion regarding the company's controls may be causing auditors to be unduly cautious in identifying material weaknesses. This lower effective threshold for Section 404 material weaknesses could result in many reported weaknesses that are not related to real financial reporting consequences. Supporting this idea, the percentage of less severe, account-specific material weaknesses rises from 58 percent of our Section 302 disclosures to 64 percent of our Section 404 disclosures.[18]

Next, since non-accelerated filers are not yet subject to Section 404, it is possible that the bias in our existing Section 404 sample (e.g., 404 reporters are bigger and financially stronger) is leading to our finding of no relation between material weaknesses and accruals quality. For example, the median of total assets and market capitalization is $327 million and $377 million for Section 404 reporters versus $109 million and $49 million for Section 302 reporters. The Section 404 firms also have lower *Loss Proportion* (0.39 versus 0.46), *Sales Volatility* (0.266 versus 0.311), and *CFO Volatility* (0.105 versus 0.118) than the Section 302 firms. Although we control for these specific factors in our tests in Table 6, these controls may be incomplete. Future tests on Section 404 disclosures that include smaller, non-accelerated filers may yield different results from those shown in Table 6.

Finally, while the disclosure of material weaknesses is mandatory under Section 404, ambiguity exists as to whether material weaknesses are required to be disclosed under

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[17] Interestingly, if we exclude the 86 Section 404 material weakness disclosure firms that also filed a material weakness under Section 302, then the remaining 291 Section 404 material weakness disclosures are not associated with accruals quality in any of our regressions. Unfortunately, we are not able to discern how long the 291 internal control problems have been in existence (see Section III). Because our accruals quality variable is measured from 1996–2002, new internal control problems are not expected to be associated with our measure.

[18] Note that this increase in account-specific weaknesses would not explain our result showing a weaker relation for company-level disclosures. However, it is also possible that the language imposed by auditors describing weaknesses is more severe under Section 404 causing us to code some account-specific weaknesses as more severe, company-level types, which would dilute the power of our tests.

TABLE 6
Accruals Quality and Material Weaknesses under Sections 302 and 404

	Dependent Variable = *Accruals Quality* (*AQ*)			
	Under Section 302		Under Section 404	
Independent Variables	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**
Intercept	0.026 (5.03[a])	0.026 (5.04[a])	0.028 (5.26[a])	0.028 (5.26[a])
MW	0.007 (3.22[a])		0.002 (0.95)	
MW_Account-Specific		0.003 (1.23)		−0.000 (−0.20)
MW_Company-Level		0.011 (3.73[a])		0.005 (2.00[b])
Loss Proportion	0.007 (2.86[a])	0.006 (2.84[a])	0.005 (2.15[b])	0.005 (2.09[b])
Sales Volatility	0.047 (15.40[a])	0.047 (15.38[a])	0.044 (12.95[a])	0.044 (12.97[a])
CFO Volatility	0.240 (31.15[a])	0.240 (31.18[a])	0.224 (23.91[a])	0.223 (23.87[a])
Total Assets	−0.004 (−11.17[a])	−0.004 (−11.13[a])	−0.004 (−9.11[a])	−0.004 (−9.04[a])
Operating Cycle	0.004 (4.64[a])	0.004 (4.61[a])	0.004 (5.10[a])	0.004 (5.07[a])
Firm Age	−0.001 (−1.18)	−0.001 (−1.18)	−0.002 (−2.17[b])	−0.002 (−2.16[b])
Segments	0.002 (1.58)	0.002 (1.57)	0.002 (1.72[c])	0.002 (1.70[c])
Extreme Sales Growth	−0.000 (−0.23)	−0.000 (−0.20)	−0.000 (−0.00)	0.000 (0.10)
Restructuring Charge	0.001 (0.08)	−0.001 (0.10)	0.011 (0.90)	0.011 (0.87)
Number of Material Weakness Obs.	354	354	377	377
Number of Total Obs.	3,297	3,297	2,451	2,451
Adjusted R^2	55.49%	55.53%	49.03%	49.07%

[a,b,c] Significant at a two-tailed p-value ≤ 0.01, 0.05, or 0.10, respectively.

Material weakness firms under Section 302 are those that have a market value of less than $75 million or disclosed their material weakness prior to November 15, 2004. The control sample for Section 302 firms is all control firms (as described in Table 1). Material weakness firms under Section 404 are those that have a market value of at least $75 million *and* disclosed a material weakness on or after November 15, 2004; a firm can be both a 302 and 404 discloser if they disclosed a material weakness under both regimes. The control sample for Section 404 firms is all control firms that have a market value of at least $75 million.

Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.

All variables are defined in Table 1, Panel B.

Section 302.[19] If a large number of firms are treating material weakness disclosures under Section 302 as voluntary, it is possible that many firms are choosing not to report less severe Section 302 material weaknesses, thus leaving a reported 302 sample that is more serious in nature and more correlated with poor accruals quality.

Overall, the results seem to indicate that the Section 404 material weakness disclosures are less informative in identifying firms with real financial reporting concerns (e.g., lower accruals/earnings quality). This finding is especially important given the high cost of compliance with Section 404. However, given the limitations noted above for the initial Section 404 disclosures in our sample, future tests using a longer time-series and a more inclusive 404 sample may find different results.

V. ROBUSTNESS CHECKS

Self-Selection of Internal Control Quality

In our main analysis, we include known determinants of material weaknesses as independent variables and focus on material weaknesses (the most severe problems), which are effectively required to be disclosed, thereby eliminating much of the choice to disclose (see footnote 19). Nevertheless, it is still possible that firms can choose both the quality of their internal controls and their efforts to discover and disclose any known weaknesses (Ashbaugh-Skaife et al. 2007). This choice introduces a possible self-selection bias into our observed sample. In this section, we econometrically control for self-selection bias in two ways. First, we use a two-stage approach and estimate a probit regression of *MW* on the determinants of material weaknesses. This first-stage regression closely follows Doyle et al. (2007) and is presented in Appendix B. From this first-stage regression, which identifies the likelihood of a firm being "selected" as a material weakness firm, we calculate the inverse Mills ratio (see Heckman 1979; Leuz and Verrecchia 2000) and include this ratio in our accruals quality regressions. Including the ratio in our main regressions helps control for the likelihood of self-selecting into the material weakness group. As shown in Table 7, after including the inverse Mills ratio, the results are similar to those in Table 4. The coefficient estimate of *MW* in the first column of Table 7 becomes 0.010 (t-statistic = 2.08) and the coefficient for the company-level material weaknesses in the second column is 0.013 (t-statistic = 2.53).[20]

Second, we control for self-selection by creating a matched sample based on the predicted probabilities from the first-stage probit regression. This method, known as propensity score matching (LaLonde 1986), creates a nonmaterial-weakness control sample with the

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[19] While Question 9 of the SEC's Frequently Asked Questions (SEC 2004) seems to imply that firms should only "carefully consider" whether to publicly disclose material weaknesses under Section 302, Question 11 states without reserve that "[a] registrant is obligated to identify and publicly disclose all material weaknesses." Confusion arises due to the existence of two largely overlapping definitions of controls ("disclosure controls and procedures" and "internal controls over financial reporting"), two reporting regimes (Sections 302 and 404), and two tiers of reporting requirements (accelerated versus non-accelerated filers). Although some firms might interpret the material weakness disclosure requirement under Section 302 as voluntary, our reading of the bulk of SEC guidance and many firms' begrudging material weakness disclosures seems to indicate that most firms are treating the disclosure as mandatory.

[20] We consider multiple additional variables in our first-stage regression to ensure that we are properly controlling for volatility and performance. Specifically, we have considered: sales volatility, cash flow volatility, the rank of market-adjusted stock returns, and an indicator variable if sales growth falls into the lowest quintile in a given industry. Results are qualitatively and quantitatively consistent with those presented.

TABLE 7
Accruals Quality and Material Weaknesses with Self-Selection Controls

	Dependent Variable = *Accruals Quality* (*AQ*)			
Selectivity Control Method:	**Inverse Mills Ratio**		**Propensity Score Matching**	
Independent Variables	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**	**Coefficient Estimate (t-statistic)**
Intercept	0.028 (5.39^{a})	0.028 (5.36^{a})	0.027 (2.94^{a})	0.026 (2.92^{a})
MW	0.010 (2.08^{b})		0.004 (1.71^{c})	
MW_Account-Specific		0.008 (1.52)		0.002 (0.66)
MW_Company-Level		0.013 (2.53^{b})		0.007 (2.39^{b})
Loss Proportion	0.007 (3.03^{a})	0.006 (2.98^{a})	0.004 (0.95)	0.003 (0.90)
Sales Volatility	0.047 (16.17^{a})	0.047 (16.16^{a})	0.042 (8.97^{a})	0.042 (8.97^{a})
CFO Volatility	0.233 (31.74^{a})	0.233 (31.73^{a})	0.246 (19.33^{a})	0.245 (19.32^{a})
Total Assets	−0.004 (−12.36^{a})	−0.004 (−12.28^{a})	−0.005 (−8.41^{a})	−0.005 (−8.30^{a})
Operating Cycle	0.004 (5.22^{a})	0.004 (5.20^{a})	0.004 (3.26^{a})	0.004 (3.23^{a})
Firm Age	−0.001 (−1.06)	−0.001 (−1.04)	−0.001 (−0.66)	−0.001 (−0.62)
Segments	0.002 (1.97^{b})	0.002 (1.94^{c})	0.005 (2.36^{b})	0.005 (2.35^{b})
Extreme Sales Growth	0.000 (0.10)	0.000 (0.17)	0.002 (0.53)	0.002 (0.63)
Restructuring Charge	0.002 (0.29)	0.002 (0.28)	0.002 (0.22)	0.002 (0.22)
Number of Material Weakness Obs.	645	645	645	645
Number of Total Obs.	3,588	3,588	1,290	1,290
Adjusted R^2	54.83%	54.86%	53.38%	53.45%

^{a,b,c} Significant at a two-tailed p-value ≤ 0.01, 0.05, or 0.10, respectively.
Each of the continuous variables is winsorized at 1 percent and 99 percent to mitigate outliers.
All variables are defined in Table1, Panel B.

same predicted probabilities of having a material weakness. The propensity score matching method produces a matched sample of 645 control firms that meet the data requirements to test H1. When using a matched sample, the results shown in the third and fourth columns of Table 7 are similar to those in Table 4. The coefficient estimate on *MW* in the third column of Table 7 is 0.004 (t-statistic = 1.71) and the coefficient for the company-level material weaknesses in the fourth column is 0.007 (t-statistic = 2.39).[21]

Auditor Type and Auditor Changes Sensitivity Analysis

Both auditor type and auditor changes have been shown to be associated with disclosing an internal control problem. Ge and McVay (2005) and Ashbaugh-Skaife et al. (2007) document a positive association between being audited by large auditors (the Big N, BDO Seidman, and Grant Thornton) and disclosing internal control problems. Ashbaugh-Skaife et al. (2007) document that auditor changes are also positively associated with the disclosure of internal control problems. Both auditor type and auditor changes have also been shown to be associated with accruals quality (Becker et al. 1998; DeFond and Subramanyam 1998; Francis et al. 1999). In this section, we consider the effects of both auditor type and auditor changes on the association between accruals quality and material weakness disclosures.

As our accruals quality measure spans 1996–2002, we track the auditor for each of the firms in our sample across these years. We then create three new variables. *Big N* is the proportion of years the company was audited by a Big N audit firm; this variable has an in-sample mean of 86 percent. *Large Auditor* is the proportion of years the company was audited by a large auditor (described above); this variable has an in-sample mean of 91 percent. We also create a variable *Auditor Change*, which is the proportion of years the company changed its audit firm (excluding changes due to mergers); this variable has an in-sample mean of 9 percent. In general, we expect firms audited by larger auditors to have higher accruals quality (i.e., we expect a negative sign on auditor type). As DeFond and Subramanyam (1998) only consider the two years around the auditor change, while we consider a seven-year span, we do not have a predicted sign on auditor change.

We find that across both measures of auditor size (*Big N* and *Large Auditor*), the larger auditors are associated with higher accruals quality, and *Auditor Change* is associated with lower accruals quality. Including these additional controls does not affect our inferences regarding internal control quality—material weakness disclosures continue to be associated with poorer accruals quality (t-statistic = 2.60 and 2.66 with *Big N* and *Large Auditor*, respectively; not tabulated).

Audit Committee Quality Sensitivity Analysis

Krishnan (2005) documents that internal control deficiencies are negatively associated with audit committee quality, including audit committee independence, in her sample of firms that changed auditors from 1994 through 2000. Relatedly, Klein (2002) finds that audit committee independence is associated with lower levels of abnormal accruals and suggests that independent audit committees are able to constrain earnings management. Therefore, audit committee independence could be a correlated omitted variable. To investigate this possibility, we collect 2002 audit committee independence data from the Investor Research Responsibility Center's corporate governance dataset and re-estimate our regressions for the 1,133 observations with sufficient data. We find that *MW* remains strongly associated with poorer accruals quality (t-statistic = 3.15), while the percentage of independent directors is associated with better accruals quality (t-statistic = 1.80). This finding suggests that the relation between internal control and accruals quality goes beyond the effect of corporate governance on accruals quality documented in the prior literature.

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[21] An alternative way to test our hypotheses using the propensity score match approach is to take the differences of the variables between the test and matched control firms and test the significance of the intercept coefficient. Results are very similar using this alternative approach. For all material weaknesses, the intercept coefficient is positive and significant; 0.004 with a p-value of 0.051. The intercept coefficient is insignificant for account-specific weaknesses (p-value of 0.348) and positive and significant for company-level weaknesses (0.007 with a p-value of 0.044).

VI. CONCLUSION

We examine the relation between accruals quality and internal control quality and find that firms with weak internal control over financial reporting generally have lower accruals quality. We measure accruals quality as the extent to which accruals are realized as cash flows, following Dechow and Dichev (2002). We identify weak internal control firms as those that disclosed a material weakness in internal control from August 2002 to November 2005 under Sections 302 and 404 of Sarbanes-Oxley. The relation between weak internal controls and poor accruals quality holds after controlling for known determinants of both accruals quality and internal control deficiencies. Moreover, the results are robust to corrections for self-selection bias using both the inverse Mills ratio approach and propensity score matching.

We examine four additional proxies of accruals quality: discretionary accruals, the average absolute value of the Dechow and Dichev (2002) residuals, historical restatements, and earnings persistence. Our results are consistent using each of these alternative proxies. The results also seem to be consistent when measuring these variables concurrently in the year of material weakness disclosure, rather than over a preceding time period.

Finally, we explore the severity of the material weaknesses (account-specific versus company-level) and the reporting regime (Section 302 versus Section 404). We find that those firms with company-level material weaknesses rather than more auditable, account-specific problems drive the relation between weak internal controls and lower accruals quality. This result is consistent for both Sections 302 and 404 disclosures, although we find that material weakness disclosures made under Section 302 are more strongly associated with lower accruals quality than those under Section 404.

Our study has several limitations. First, we rely on the disclosure of a material weakness to proxy for the actual presence of an internal control problem. Therefore, to the extent that there is a systematic bias in the choice to identify and disclose material weaknesses—beyond those variables used as controls—our sample may not represent the true underlying population of firms with internal control problems. Second, we assume that the material weaknesses have been present for multiple years; our accruals quality measure is constructed from 1996–2002. However, it is hard to pinpoint the exact timing of the weaknesses and this assumption may not be valid. Third, since Sarbanes-Oxley has been in effect for a relatively short time, our ability to infer causality between internal control problems and accruals quality is limited. Finally, we must rely on a proxy for accruals quality. We use the model developed by Dechow and Dichev (2002) as modified by McNichols (2002) and Francis et al. (2005). As with any measure, ours is subject to certain limitations (e.g., McNichols 2002; Wysocki 2006) and might measure the accruals quality construct with noise.

Our findings have implications for regulators, auditors, managers, and researchers. First, our findings support the notion that the internal control environment is a fundamental element in the production of high-quality accruals, a link that has long been suggested (Kinney 2000) but was largely untestable prior to the introduction of Sarbanes-Oxley Sections 302 and 404. Second, our findings add to the debate on the benefits of Sarbanes-Oxley, suggesting that company-level material weakness disclosures are, at least in part, appropriately identifying "poor quality" firms—specifically, those with poor accruals quality. However, the results in this paper show no such benefits from the disclosure of more auditable, account-specific weaknesses. Finally, our findings support the notion that at least some portion of accruals quality is incremental to the innate drivers of poor accruals quality, such as firm size or sales volatility, and thus subject to improvement by managers.

APPENDIX A

MATERIAL WEAKNESS CLASSIFICATION SCHEME

Account-Specific Material Weaknesses

1. Inadequate internal controls for accounting for loss contingencies, including bad debts
2. Deficiencies in the documentation of a receivables securitization program
3. No adequate internal controls over the application of new accounting principles or the application of existing accounting principles to new transactions

Company-Level Material Weakness

1. Override by senior management
2. Ineffective control environment

Account-Specific Material Weakness Disclosure Examples

Enova Systems Incorporated

Moss Adams advised the Company of a reportable condition involving the Company's internal controls in its procedures for tracking and reporting inventory. In 2002, this was reported to the Company by Moss Adams as a material weakness. Moss Adams informed the Company that (i) controls were not in place to timely detect possible inventory misstatements and (ii) the inability to timely detect these possible misstatements could potentially misstate cost of goods sold in the quarterly financial statements.

Harken Energy Corp.

On June 29, 2004, BDO advised the management and the Audit Committee that a material weakness in internal control over the Company's financial reporting exists. The material weakness relates to the Company's inability to determine the appropriate accounting for nonroutine securities transactions on a timely basis.

Company-Level Material Weakness Disclosure Examples

Health Express USA

As part of the audit for the year ended December 28, 2003, Ahearn, Jasco & Company, P.A. reported to management certain material weaknesses in the Company's internal control systems relating to the Company's controls over (1) nonaccounting documents to the extent this information is communicated to the Chief Financial Officer, and (2) the internal accounting controls regarding segregation of duties.

Vaxgen Inc.

In connection with the completion of its audit ... KPMG advised the Audit Committee of the Company's Board of Directors of the following material weaknesses: Inappropriate revenue recognition for government contracts; Account reconciliations not performed on a timely basis or at all; Inadequate segregation of duties; Insufficient controls over recording of journal entries; and Lack of adequate depth of accounting knowledge.

APPENDIX B
DETERMINANTS OF MATERIAL WEAKNESSES FIRST-STAGE ESTIMATION

Independent Variables	Predicted Sign	Dependent Variable = Material Weakness (*MW*) Coefficient Estimate ($Pr < \chi^2$)
Intercept		−1.213 (0.001)
Marketcap	−	−0.067 (0.001)
Firm Age	−	−0.025 (0.385)
Aggregate Loss	+	0.247 (0.001)
Segments	+	0.226 (0.001)
SPEs	+	0.066 (0.005)
Foreign Transactions	+	0.122 (0.044)
Acquisition Value	+	0.649 (0.008)
Extreme Sales Growth	+	0.099 (0.066)
Restructuring Charge	+	0.677 (0.079)
Industry Indicator Variables		Included
Number of Material Weakness Obs.		844
Number of Total Observations		5,303
Likelihood Ratio Score ($Pr < \chi^2$)		240.90 (0.001)

MW = indicator variable that is equal to 1 if the firm disclosed a material weakness in internal control in our sample period (August 2002 to November 2005), and 0 otherwise;
Marketcap = log of share price × number of shares outstanding (Compustat data item #25 × data item #199);
Aggregate Loss = indicator variable equal to 1 if earnings before extraordinary items (data item #123) in years t and $t-1$ sum to less than 0, and 0 otherwise;
SPEs = log of the number of special purpose entities reported by the company in year t;
Foreign Transactions = indicator variable equal to 1 if the firm has a non-zero foreign currency translation [data item #150] in year t, and 0 otherwise; and
Acquisition Value = aggregate dollar value of acquisitions that result in at least 50 percent ownership of the acquired company in years t and $t-1$, scaled by the acquiring firm's year t market capitalization.

All other variables are defined in Table 1, Panel B.

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Unbalanced Information and the Interaction between Information Acquisition, Operating Activities, and Voluntary Disclosure

Eti Einhorn
Tel Aviv University

Amir Ziv
Columbia University
and
Interdisciplinary Center Herzliya

ABSTRACT: As different activities cannot be measured or communicated with the same precision, accounting information is often only a partial and unbalanced reflection of the fundamental economics, emphasizing certain aspects of the underlying operations while disregarding others. We highlight this inherent imbalance in information as the source of an interaction between corporate operating and discretionary disclosure strategies, and thereby also as an important determinant of the information acquisition strategy. We demonstrate that information imbalance, via its distorting effect on operating activities, leads to a reduction in the propensity of managers to acquire information and provide voluntary disclosures.

Keywords: *financial accounting; asymmetric information; voluntary disclosure.*

I. INTRODUCTION

In this paper, we investigate the interrelation between corporate discretionary disclosure and operating strategies, as well as their interaction with information acquisition activities, highlighting the information structure as a crucial source of these relationships. Our study is rooted in the notion that different activities cannot be measured or communicated with the same level of precision (and some activities cannot be measured or communicated at all). As a result, information produced and reported by a firm is often only a partial and unbalanced reflection of its fundamental economics, emphasizing some aspects

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of the firm's operations while disregarding others. The unbalanced structure of information has been identified by Holmstrom and Milgrom (1991) and subsequent papers (e.g., Feltham and Xie 1994; Zhang 2003; Hughes et al. 2005) as a cause of production inefficiencies under moral hazard settings with mandatory disclosure. Our primary contribution to this line of research is in exploring the suppressing impact of the inherent imbalance in information on the propensity of managers to acquire information and provide voluntary disclosures, via its well-known distorting effect on operating decisions.

Our analysis applies to a wide range of business processes where managerial operating decisions are unobservable to outsiders, but managers can acquire and credibly disclose useful, albeit noisy and unbalanced, measures of the resulting operating performance. The analysis pertains particularly to situations in which the information imbalance is salient and unobservable operating decisions significantly affect the information content. Firms with operations that are multifaceted in nature provide a natural point of reference. Diversity in the operating activities could take various forms. Firms may operate in several industries (conglomerates, financial institutions that provide both investments and insurance services), they may operate in several markets (public and private sectors, domestic and international), their operations may involve multi-task processes (aviation, oil—exploration, production and refining), and they may normally conduct both short-term and long-term projects (research and development in conjunction with production, products that require different aging—wine and liquor). In all these cases, performance measures are likely to be unbalanced as they are the aggregate of several operating activities that, due to differences in their economic nature, are subject to different measurement and reporting constraints. Aggregated performance measures, besides being unbalanced, are also sensitive to resource allocation decisions, such as the allocation of capital, equipment, and manpower.

We consider a model of a multi-divisional firm traded in a rational and risk-neutral market, whose manager makes three interrelated decisions: a resource allocation decision, an information acquisition decision, and a voluntary disclosure decision. To initiate the production process, the manager privately allocates the firm's limited resources among its operating divisions. While this operating decision is unobservable to investors, the manager can later acquire information that measures the operating performance of the firm, helps to augment it, and can be credibly communicated to investors. Such information is unbalanced in the sense that it is not equally informative about the performance of the firm's different operating divisions. Based on private knowledge regarding the cost of acquiring the information, the manager decides whether to acquire it. The information, if acquired, arrives after some stages of the production process have been completed, serving the manager in fine-tuning the remainder of the production process and enhancing the production output. Since the information can be credibly communicated, its acquisition also confronts the manager with the decision on whether to voluntarily disclose it to investors. The manager's resource allocation, information acquisition, and disclosure decisions are all made in light of their anticipated impact on the firm's future cash flows, as well as on the firm's current market price, which, in turn, is determined by the investors' rational expectations regarding the manager's strategies.

Recognizing the cost of acquiring information, the manager is capable of anticipating the future availability or lack of information. Upon anticipating the arrival of disclosable information that emphasizes the performance of one of the firm's divisions, the manager inevitably has the incentive to inefficiently bias the resource allocation toward that particular division. By doing so, the manager improves the expected content of the information, trying to manipulate the inference that will be drawn by investors in case of disclosure and thereby boosting the firm's expected market price. This result is consistent with Holmstrom and Milgrom (1991), who show that managers cannot resist directing inefficient amounts of resources toward those tasks that have the greatest impact on observable performance measures. Unlike prior studies, however, the disclosure of the performance measure in our model is under the manager's discretion, and thus the suboptimal operating decision induced by the potential unbalanced disclosure has an additional backward effect on the disclosure decision. Disclosure resolves the investors' uncertainty regarding the manager's information endowment, and therefore reveals not only the operating advantage of information in improving the production process, but also the implied inefficiency in resource allocation, generating endogenous disclosure costs that diminish the manager's incentive to provide voluntary disclosure. Thus, in the presence of unbalanced information, a mutual dependence emerges between the firm's operating and disclosure activities, which leads to both production and disclosure distortions (Proposition 1).

Due to its distorting impact on the production and disclosure activities of the firm, the imbalance in information also affects the information acquisition activity. By creating an unavoidable production distortion, the imbalance reduces the advantage of information in improving the production process. Furthermore, by decreasing the disclosure intensity, the imbalance reduces the advantage of possessing information in manipulating the market's expectations about the firm via voluntary disclosures. Altogether, when information is unbalanced, it becomes less valuable to the manager from both the operating and the disclosure perspectives. The manager is thus less motivated to acquire information, and may not acquire value-enhancing information, even when its potential operating benefit exceeds its cost (Proposition 2). The less likely information acquisition becomes, the easier it is for the manager to hide behind the cover of not possessing information and avoid unfavorable disclosure, which still further reduces her propensity to provide voluntary disclosure. Information imbalance therefore endogenously evokes the two well-known triggers for suppressing disclosure: disclosure costs (Verrecchia 1983) and uncertainty regarding the information endowment (Dye 1985). By exploring the imbalance in information as a factor that impedes disclosure, our work joins the extensive research endeavor toward an understanding of why firms do not fully disclose their private information in capital markets with rational expectations, as suggested by the earlier studies of Grossman and Hart (1980), Grossman (1981), and Milgrom (1981).[1]

Other studies that analyze relationships between discretionary disclosure and operating decisions, though not their interplay with information acquisition decisions, include Lanen and Verrecchia (1987) and Pae (2002). Using different settings, both arrive at the conclusion that observable operating decisions might serve as noisy manageable substitutes for unfavorable disclosures, and might therefore be distorted in anticipation of the inferences of investors about the underlying withheld information. Our study explores other kinds of interactions between operating and disclosure activities that apply to a different class of frequent scenarios, in which the managerial operating decision is unobservable to investors and the information underlying the disclosure decision is a performance measure that arrives after the operating decision has been made rather than beforehand. In other words, while prior studies focus on interactions between operating and disclosure strategies that stem from the ability of investors to learn from an observable operating decision something about the underlying withheld information, we explore interactions that arise due to the capability of disclosed information to provide investors with a clue about an unobservable operating decision.

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[1] For other factors the suppress voluntary disclosures, see Verrecchia (1983), Dye (1985, 1986), Nagar (1999), Einhorn (2007), and Suijs (2007). For surveys of the voluntary disclosure literature, see Dye (2001) and Verrecchia (2001).

The paper proceeds as follows. Section II provides a description of our model. Equilibrium is defined in Section III. It is analyzed for the operating and disclosure decisions in Section IV and for the information acquisition decision in Section V. Concluding remarks are offered in Section VI. Highlights of the proofs appear in the Appendix.

II. MODEL

Our model depicts a public firm that first makes an operating decision that is unobservable to investors. Subsequently, the firm considers the acquisition of a noisy and unbalanced performance measure that can streamline production and can also be credibly disclosed. Our model thus involves three interrelated managerial decisions: an operating decision, an information acquisition decision, and a voluntary disclosure decision. These decisions are shaped by the manager's rational anticipation of their effect on the firm's future cash flows, as well as on its current market price, which, in turn, is determined based on the investors' rational expectations about the manager's decisions. The interaction between the three managerial decisions stems from the unbalanced structure of the information. Below we detail the model's ingredients, which are assumed to be commonly known to all players, unless otherwise indicated.

Production Environment

The firm is comprised of two separate divisions, which produce and sell different products, while sharing a common resource.[2] We assume that the common resource is of limited capacity, which is normalized to one unit without loss of generality. The production technology in each division is stochastic and exhibits positive, but decreasing, expected returns to scale. The allocation of the common resource between the two divisions is under the manager's discretion (her operating decision) and is unobservable to the market. After allocating the common resource between the two divisions and completing some steps of the production process, but before it ends, the manager might privately observe information that measures the performance of both divisions.[3] The arrival of this private information enables the manager to refine the remainder of the production process and enhance production. Such refinements might include, for example, machinery tuning and adjustments, recycling of residue materials, or reassignment of employees.

We represent the production technology of each division $j (j = 1,2)$ by the increasing and concave function f_j: $\{inf,ui\} \times [0,1] \rightarrow \Re^+$, where *inf*(*ui*) stands for an informed (uninformed) manager. If information is not available, then the mean of the uncertain cash flows of the first division is $f_1(ui,r)$ and that of the second division is $f_2(ui,1 - r)$, given that $r \in [0,1]$ is the resource share allocated to the first division (and thus $1 - r$ is the resource share allocated to the second division).[4] Conditioned on a future receipt of information, the expected cash flows of both divisions are improved and become $f_1(inf,r) = (1 + \lambda_1)f_1(ui,r)$ and $f_2(inf,1 - r) = (1 + \lambda_2)f_2(ui,1 - r)$, respectively, where $\lambda_1, \lambda_2 \geq 0$. The parameters λ_1 and λ_2 represent the real value of the information in enhancing the expected production, and the special case of $\lambda_1 = \lambda_2 = 0$ captures the possibility that information has no such real value.[5] Given the manager's future information status, $a \in \{inf, ui\}$, and the resource share allocated to the first division, $r \in [0,1]$, the divisions' uncertain cash flows are represented by the random variables $CF_1(a,r)$ and $CF_2(a,1-r)$, which are assumed to be uncorrelated and normally distributed, with means $f_1(a,r)$ and $f_2(a,1-r)$, and variances σ_1^2 and σ_2^2, respectively. Accordingly, the random variable $CF(a,r) = CF_1(a,r) + CF_2(a,1-r)$ is defined as the firm's total cash flows and is normally distributed with mean $\mu(a,r) = f_1(a,r) + f_2(a,1-r)$ and variance $\sigma^2 = \sigma_1^2 + \sigma_2^2$.

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[2] The model can be generalized to consider more than two divisions without qualitatively affecting the results.

[3] Below we expand on the process of information acquisition and disclosure, as well as on the information structure.

[4] Hereafter, we interchangeably use cash flow and output, implicitly normalizing all output prices to be 1.

Information Environment

The manager can acquire information at a cost c.[6] Hence, given the manager's information status, $a \in \{inf, ui\}$, and the resource share allocated to the first division, $0 \leq r \leq 1$, the firm's net cash flows, denoted by $NCF(a,r)$, are $NCF(inf,r) = CF(inf,r) - c$ if information is acquired and $NCF(ui,r) = CF(ui,r)$ otherwise. Similarly to Pae (1999, 2004), while the manager knows the information acquisition cost, investors are uncertain and consider it a random variable, C, that is distributed over the interval $[\underline{c},\bar{c}] \subseteq \Re^+$ with a cumulative distribution function Γ.[7] That is, the manager's information superiority is twofold. Prior to making the resource allocation decision, the manager privately observes the cost of acquiring information. After making the resource allocation decision, and conditioned on acquiring the information, the manager privately observes its content. We assume that the manager cannot credibly reveal to the market either the information acquisition cost or her information status. Upon receiving the information, however, the manager has to decide whether to make a credible disclosure of its content.[8]

We now detail the information structure. Consistent with Holmstrom and Milgrom (1991), our approach stems from the observation that, in general, different activities cannot be measured with the same degree of precision (and some activities cannot be measured at all).[9] Information that is reported to outsiders is subject to many constraints, apart from those relating to its measurement, as it must be available, timely, and verifiable, all at the same time. Therefore, it is often the case that different activities cannot be communicated with the same level of precision, even if they involve similar measurement restrictions. As a result, financial information produced and reported by a firm normally provides only a partial and unbalanced picture of the firm's fundamental economics, giving emphasis to some aspects of the firm's operations and failing to capture others. In particular, measurement and reporting constraints are the reason for systematically applying different measurement rules to the different components that are aggregated into accounting measures, and thus aggregated measures are even more likely to be noisy and unbalanced. For example, imbalance is likely to occur in any accounting measure that aggregates earnings of divisions with different reliance on research and development, due to the special way that R&D activities are measured by accounting systems. Another example is imbalance in an aggregated earnings measure of divisions with reliance on similar equipment, due to differences in the timing of purchasing the equipment, which imply different acquisition costs and therefore also different depreciation expenses.[10]

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[5] Though a real value of information is rarely assumed in the disclosure literature, we chose to incorporate it into our model in order to make it more representative of the real world. This feature of the model does not qualitatively affect the equilibrium outcomes, thus adding robustness to our results. However, as this is not the main focus of our analysis, for the sake of simplicity, we assume a constant real value of information that is independent of the information content. From a modeling perspective, this simplifying assumption is analogous to the standard assumption of constant disclosure costs that are independent of the disclosed content. In this context, see Einhorn (2005) for an analysis that demonstrates the robustness of equilibrium outcomes to information-dependent disclosure costs.

[6] Though we could have assumed an exogenous probability of information arrival (as in Dye 1985), we chose to incorporate an endogenous information acquisition decision into the model. This allows us to shed light not only on the nature of the interaction between operating and disclosure decisions, but also on their interplay with information acquisition decisions. Nevertheless, in Section IV, we also provide the analysis of a simplified version of the model with exogenous arrival of information.

[7] Uncertainty on the part of investors about the cost of acquiring information is used in the model as the source of uncertainty about the information endowment. Even if the cost of information is perfectly and commonly known, there could be other sources of uncertainty about the information endowment, such as uncertainty about the availability of information or uncertainty about its real value. While uncertainty about the information endowment plays a crucial role in our analysis, the specific way of modeling it does not affect the results.

[8] Credible disclosure is often assumed in the literature. It is usually justified by procedures (like audit or due diligence) that verify the manager's reported information or by the potential litigation and human capital erosion costs associated with misleading disclosure.

[9] Holmstrom and Milgrom (1991) provide several examples of imbalance in the ability to measure performance (e.g., for teachers, contractors, or franchises).

To capture this typical characteristic of aggregated information, we model the manager's private information as a noisy unbalanced aggregated signal of the cash flows generated by the two operating divisions. Specifically, given the share of the resource allocated to the first division, $0 \leq r \leq 1$, we represent the manager's private signal by the random variable $S(r)$ and assume that $S(r) = CF_1(inf,r) + (1 - \omega)CF_2(inf,1 - r) + \varepsilon$, where ω is a scalar and $\varepsilon \sim N(0,\sigma_\varepsilon^2)$ is an independent random noise. That is, $S(r)$ is a random variable that is normally distributed with mean $\mu_S(r) = f_1(inf,r) + (1 - \omega)f_2(inf,1 - r)$ and variance $\sigma_S^2 = \sigma_1^2 + (1 - \omega)^2\sigma_2^2 + \sigma_\varepsilon^2$. The parameter ω represents the extent of imbalance in the manager's private signal, $S(r)$. Insofar as $\omega \neq 0$, the manager's private signal is not equally informative about the cash flows of the firm's two divisions.[11] Without loss of generality, we assume that the signal emphasizes the cash flows of the first division, that is, $0 \leq \omega \leq 1$. Two extreme cases deserve special attention. When $\omega = 0$, the manager's private signal is equally informative about the cash flows of the two divisions, describing balanced information. Later on, we benchmark our results against this case. The other extreme case, $\omega = 1$, depicts situations where the performance of one of the firm's divisions cannot be measured or communicated at all, so the manager's private signal pertains to only one division. The informational quality of the manager's private signal can be summarized by its correlation with the firm's cash flows, denoted ρ. Note that ρ is positive and decreasing in both the information imbalance, ω, and the information noisiness, σ_ε.

Timeline

Figure 1 provides a timeline depicting the sequence of events in our model. At the beginning, prior beliefs of all players are determined. Then, the manager privately observes the cost c of acquiring the private signal and, accordingly, privately makes two decisions. She makes the resource allocation decision, $r \in [0,1]$, and the common resource is allocated to the two divisions: a share of r to the first division and $1 - r$ to the second division. She also makes the information acquisition decision, $a \in \{inf,ui\}$, choosing whether to acquire

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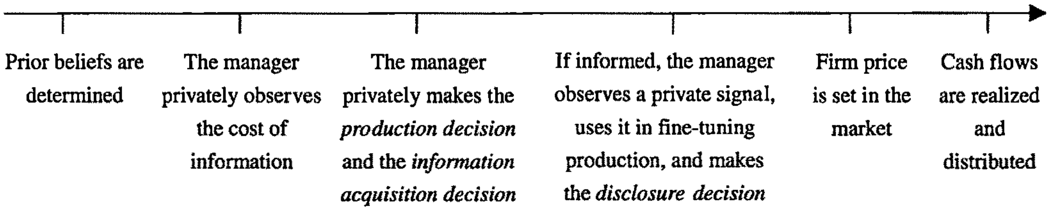
[10] Other examples include aggregated accounting measures that are unbalanced due to differences in revenue recognition timing, differences in asset measurements (historical cost versus market value), differences in liability measurements (present value versus non-present value), differences in accounting estimates (discount rates, depreciation rates), and off balance sheet items (human capital, contingencies).

[11] The role of the parameter ω can be demonstrated by considering two signals of the form $S_1(r) = CF_1(inf,r) + \varepsilon_1$ and $S_2(r) = CF_2(inf,1 - r) + \varepsilon_2$, where ε_1 and ε_2 are normally distributed noise terms with zero mean and variances $\sigma_{\varepsilon_1}^2$ and $\sigma_{\varepsilon_2}^2$, respectively. As long as $\varepsilon = \varepsilon_1 + (1 - \omega)\varepsilon_2$ and $\omega = 1 - \sigma_2^2(\sigma_1^2 + \sigma_{\varepsilon_1}^2)/\sigma_1^2(\sigma_2^2 + \sigma_{\varepsilon_2}^2)$, the information content of the aggregated signal $S(r) = CF_1(inf,r) + (1 - \omega)CF_2(inf,1 - r) + \varepsilon$ is equivalent from the investors' perspective to that of the two signals $S_1(r)$ and $S_2(r)$, because $E[CF(inf,r)|S(r)] = E[CF(inf,r)|S_1(r),S_2(r)]$. Under these conditions, it also follows that $\omega \neq 0$ is equivalent to $VAR[CF(inf,r)|S_1(r)] \neq VAR[CF(inf,r)|S_2(r)]$, implying that $\omega \neq 0$ if and only if the two signals $S_1(r)$ and $S_2(r)$ are not equally informative about the future cash flow $CF(inf,r)$.

FIGURE 1
Timeline


Prior beliefs are determined
The manager privately observes the cost of information
The manager privately makes the *production decision* and the *information acquisition decision*
If informed, the manager observes a private signal, uses it in fine-tuning production, and makes the *disclosure decision*
Firm price is set in the market
Cash flows are realized and distributed

the forthcoming private signal ($a = inf$) or not to acquire ($a = ui$). Note that after observing the cost of the information, the manager can already anticipate her future information status. So, as long as the manager observes the cost of information in advance, it is immaterial which decision is made first—the information acquisition decision or the resource allocation decision. Hence, we can treat the two decisions as simultaneous. Conditioned on acquiring the information, however, there must be a time delay between allocating the resource and receiving the acquired information. Since the information is a performance measure of the operating divisions, it obviously arrives only after completing some stages of the production process (and, in particular, after the resource allocation decision is made). When the signal $S(r)$ is received and privately observed by the manager, it allows her to generate production improvements by fine-tuning the remainder of the production process. Arrival of the signal $S(r)$ is associated the real value of multiplying the expected cash flows of each division $j(j = 1,2)$ by a factor $1 + \lambda_j$. Also, based on the content of the signal, the manager makes her last decision—the disclosure decision, $d \in \{dis,nd\}$—and the signal is either disclosed ($d = dis$) or not ($d = nd$). Now, based on all the available public information, the firm's price is set in the market. Finally, at the end of the period, the firm's net cash flows $NCF(a,r)$ are realized and distributed as a dividend to the shareholders.

Players and Objective Functions

The manager chooses her resource allocation, information acquisition, and disclosure strategies based on the rationally anticipated effect on the firm's current market price and future cash flows. The assumption that the manager is interested in both the firm's current market price and its future cash flows is reasonable in a variety of prevalent situations. This is the case, for example, when the manager is compensated based on market price and at the same time is concerned about her future professional reputation, or when she is compensated based on cash flows but has ownership that she intends to liquidate at the market price. It is also the case when the firm acquires capital by issuing stocks (see, for example, Gigler 1994), or when there are different types of shareholders, some needing a quick liquidation (prior to the realization of cash flows) and others intending to hold their shares until cash is realized. Accordingly, we assume that the manager maximizes a linear combination that assigns a weight $1 - \eta$ to the firm's price and a weight η to the net cash flows, where $0 < \eta < 1$.

The firm is traded in a rational and risk-neutral capital market. Its price is therefore determined in the market as its expected cash flows, conditioned on all the available public information, including the investors' rational expectations regarding the manager's resource allocation, information acquisition, and disclosure strategies. Conditioned on disclosure, investors know that the manager was informed. In this case, using their expectations about how a manager who anticipates the future arrival of information would have allocated resources and based on the realization of the disclosed signal, investors update their beliefs about the firm's expected cash flows. On the other hand, if disclosure has not occurred, then investors predict the expected cash flows of the firm by updating their beliefs about the likelihood of acquiring the signal and its distribution (if acquired) based on their expectations regarding the manager's resource allocation, information acquisition, and disclosure strategies.

III. EQUILIBRIUM DEFINITION AND PRELIMINARY RESULTS

Equilibrium consists of the manager's strategies and the investors' pricing rule. We use the functions $A\colon [\underline{c},\bar{c}] \rightarrow \{\mathit{inf},\mathit{ui}\}$, $R\colon \{\mathit{inf},\mathit{ui}\} \rightarrow [0,1]$ and $D\colon \{\mathit{inf},\mathit{ui}\} \times \mathfrak{R} \rightarrow \{\mathit{dis},\mathit{nd}\}$ to describe the manager's information acquisition, resource allocation and disclosure strategies, respectively, whereas the investors' expectations about them are described by the functions $\hat{A}\colon [\underline{c},\bar{c}] \rightarrow \{\mathit{inf},\mathit{ui}\}$, $\hat{R}\colon \{\mathit{inf},\mathit{ui}\} \rightarrow [0,1]$ and $\hat{D}\colon \{\mathit{inf},\mathit{ui}\} \times \mathfrak{R} \rightarrow \{\mathit{dis},\mathit{nd}\}$, respectively. We also denote the investors' pricing rule by the function $P\colon \{\mathit{dis},\mathit{nd}\} \times \mathfrak{R} \rightarrow \mathfrak{R}$, and the manager's expectations about it by the function $\hat{P}\colon \{\mathit{dis},\mathit{nd}\} \times \mathfrak{R} \rightarrow \mathfrak{R}$. Explicitly, $A(c)$, $R(a)$ and $D(a,s)$ are the manager's information acquisition, resource allocation, and disclosure decisions, respectively, given the cost $c \in [\underline{c},\bar{c}]$ of acquiring information, the information status $a \in \{\mathit{inf},\mathit{ui}\}$, and the realization $s \in \mathfrak{R}$ of the private signal (if acquired). Also, $P(d,s)$ is the market price of the firm, where $d \in \{\mathit{dis},\mathit{nd}\}$ is the manager's disclosure decision and $s \in \mathfrak{R}$ is the realization of her private signal (if acquired and disclosed).

We look for Bayesian equilibrium, formally defined as a vector of functions ($A,\hat{A}\colon [\underline{c},\bar{c}] \rightarrow \{\mathit{inf},\mathit{ui}\}$, $R,\hat{R}\colon \{\mathit{inf},\mathit{ui}\} \rightarrow [0,1]$, $D,\hat{D}\colon \{\mathit{inf},\mathit{ui}\} \times \mathfrak{R} \rightarrow \{\mathit{dis},\mathit{nd}\}$, $P,\hat{P}\colon \{\mathit{dis},\mathit{nd}\} \times \mathfrak{R} \rightarrow \mathfrak{R}$) that simultaneously satisfies the following five conditions for any $c \in [\underline{c},\bar{c}]$, $a \in \{\mathit{inf},\mathit{ui}\}$, $s \in \mathfrak{R}$, and $d \in \{\mathit{dis},\mathit{nd}\}$:

$$(1)\ A(c) \in \underset{a\in\{\mathit{inf},\mathit{ui}\}}{\operatorname{argmax}} E[\eta NCF(a,R(a)) + (1-\eta)\hat{P}(D(a,S(R(a))),S(R(a)))];$$

$$(2)\ R(a) \in \underset{r\in[0,1]}{\operatorname{argmax}} E[\eta NCF(a,r) + (1-\eta)\hat{P}(D(a,S(r)),S(r))];$$

$$(3)\ D(\mathit{ui},s) = \mathit{nd},$$

$$D(\mathit{inf},s) \in \underset{d\in\{\mathit{dis},\mathit{nd}\}}{\operatorname{argmax}} E[\eta NCF(\mathit{inf},R(\mathit{inf})) + (1-\eta)\hat{P}(d,s)] = \underset{d\in\{\mathit{dis},\mathit{nd}\}}{\operatorname{argmax}} \hat{P}(d,s);$$

$$(4)\ P(d,s) = \begin{cases} E[NCF(\mathit{inf},\hat{R}(\mathit{inf}))\,|\,S(\hat{R}(\mathit{inf})) = s,\hat{A}(C) = \mathit{inf}] & \text{if } d = \mathit{dis} \\ E[NCF(\hat{A}(C),\hat{R}(\hat{A}(C)))\,|\,\hat{D}(\hat{A}(C),S(\hat{R}(\hat{A}(C)))) = \mathit{nd}] & \text{if } d = \mathit{nd} \end{cases};$$

$$(5)\ \hat{A}(c) = A(c),\ \hat{R}(a) = R(a),\ \hat{D}(a,s) = D(a,s),\ \hat{P}(d,s) = P(d,s).$$

The first equilibrium condition pertains to the information acquisition strategy, A, requiring that the manager's information acquisition decision maximizes her expected utility, given the cost of acquiring the information. Note that after acquiring the information, its cost becomes sunk, and thus is no longer relevant for the manager. The second equilibrium condition pertains to the resource allocation strategy, R, requiring that the manager's resource allocation decision maximizes her expected utility, given her information status. The third equilibrium condition, which relates to the disclosure strategy, D, implies that an uninformed manager obviously never provides disclosure, whereas the disclosure decision of an informed manager maximizes her expected utility, given the realization of her private signal. In particular, note that, in choosing her disclosure decision, the informed manager can no longer affect the firm's cash flows, and therefore her objective is reduced to maximizing the expected market price of the firm. The fourth equilibrium condition relates to the pricing rule, P. The price condition requires investors to determine the firm's price as the expected cash flows of the firm conditioned on all the available public information. The fifth, and last, equilibrium condition implies that both the investors and the manager have rational expectations regarding each other's behavior.

We start the equilibrium analysis with some preliminary results that enable us to simplify the notation and condense the representation of the manager's strategies. Focusing first on the information acquisition decision, note that the manager makes a trade-off between the benefit from possessing information and the independent cost of acquiring it. Hence, consistent with Pae (1999), the information acquisition strategy must be lower-tailed in the cost of acquiring the information, so that information is acquired if and only if its cost is below some threshold level. Formally:

Lemma 1: The manager's equilibrium information acquisition strategy, A: $[\underline{c},\bar{c}] \rightarrow \{inf,ui\}$, must be lower-tailed with a threshold $c_0 \in [\underline{c},\bar{c}]$, such that for any $c \in [\underline{c},\bar{c}]$: $A(c) = \begin{cases} inf & \text{if } c \leq c_0 \\ ui & \text{otherwise.} \end{cases}$

Lemma 1 implies that the manager's information acquisition strategy is characterized by the threshold c_0, and thus it can be equivalently described by the *ex ante* (prior to observing the information cost) probability of acquiring information, $\pi = prob[C \leq c_0] = \Gamma(c_0)$. Hereafter, we refer to π as the information acquisition intensity and use it as a condensed representation of the information acquisition strategy, A.

We now consider the resource allocation strategy. Since each division has a commonly known production technology that exhibits positive and decreasing expected returns to scale, there is a unique allocation of the limited resource, known to the manager and dependent upon her information status, that maximizes the overall expected cash flows. When the manager is uninformed and knows there will be no disclosure, the firm's market price is independent of the resource allocation decision, and thus the manager maximizes the expected cash flows by choosing the first-best resource allocation. In contrast, the optimal resource allocation of an informed manager might deviate from the first-best allocation, due to its impact on the expected content of the disclosable information and thereby on the firm's expected market price. Formally:

Lemma 2: (i) Given the manager's information status, $a \in \{inf,ui\}$, there is a unique resource allocation, $r^{FB}(a)$, that maximizes the firm's expected cash flows, where $f_1'(a,r^{FB}(a)) = f_2'(a,1 - r^{FB}(a))$ and $\mu(inf,r^{FB}(inf)) \geq \mu(ui,r^{FB}(ui))$; and
(ii) The manager's equilibrium resource allocation strategy, R: $\{inf,ui\} \rightarrow [0,1]$, must satisfy $R(ui) = r^{FB}(ui)$.

By Lemma 2, we can represent the resource allocation strategy by the incremental contribution of the information to the production process, $\delta = \mu(inf,R(inf)) - \mu(ui,r^{FB}(ui))$. Accordingly, we use δ as a compacted representation of the resource allocation strategy, R, and refer to it as the operating value of information.

Finally, as the manager's private signal is positively correlated with the firm's cash flows, the disclosure strategy must be upper-tailed in the realization of the signal. That is, consistent with extant results in the voluntary disclosure literature, including Verrecchia (1983) and Dye (1985), the manager chooses to disclose her private signal to investors if and only if its realization is sufficiently favorable, exceeding some threshold level. Formally:

> **Lemma 3:** The manager's equilibrium disclosure strategy, D: $\{inf, ui\} \times \Re \rightarrow \{dis, nd\}$, must be upper-tailed with a threshold $s_0 \in \Re$, such that for any $a \in \{inf, ui\}$ and $s \in \Re$: $D(a,s) = \begin{cases} dis & \text{if } a = inf \text{ and } s \geq s_0 \\ nd & \text{otherwise} \end{cases}$.

According to Lemma 3, the manager's disclosure strategy is characterized by the disclosure threshold s_0, and therefore it can be unequivocally represented by $\tau = prob[S(R(inf)) \geq s_0]$, which is the *ex ante* (prior to observing the realization of the signal) probability of disclosure occurrence *conditioned* on being informed. Hereafter, we refer to τ as the disclosure intensity and use it to represent the disclosure strategy, D.

Having established the basic properties of the manager's strategies, we proceed to derive the equilibrium using backward induction. First, in Section IV, we assume a given information acquisition strategy and derive the operating and disclosure strategies. Then, in Section V, utilizing our results from Section IV, we move backward and derive the information acquisition strategy. Throughout the analysis, we pay special attention to the relationship between the manager's strategies and the information imbalance, ω. To isolate the impact of a change in the extent of information imbalance, we neutralize its consequence on the informativeness of the manager's private signal. Specifically, we assume that any change in ω is accompanied by an offsetting change in σ_ε, such that the correlation between the signal and the firm's cash flows, ρ, remains intact. This assumption enables a comparison between equally informative signals that vary only in their degree of imbalance.

IV. ANALYSIS OF OPERATING AND DISCLOSURE STRATEGIES

In this section, we derive the operating and disclosure strategies in a sub-model where the information acquisition intensity, $0 < \pi < 1$, is given. This sub-model ignores the information acquisition decision, and can therefore be viewed as an extension of Dye's (1985) model involving mutually dependent disclosure and operating decisions. We explore the mutual dependence between the operating and disclosure strategies in two steps, first analyzing the operating strategy for any given disclosure strategy, and then analyzing the disclosure strategy for any given operating strategy. We benchmark the resulting operating and disclosure strategies against the case of balanced information, $\omega = 0$, where the two strategies are independent. We denote the benchmark case by the superscript B, so that δ^B and τ^B are the benchmark operating value of information and disclosure intensity, respectively.

Focusing first on the operating strategy, recall that being unable to affect the market price of the firm, an uninformed manager efficiently allocates resources between divisions, maximizing the firm's expected cash flows. In contrast, a manager who is about to be informed is aware that her resource allocation decision affects not only the firm's expected cash flows, but also the expected content of the disclosable information and thereby the expected market price of the firm. As the potentially disclosed signal is unbalanced, overemphasizing the results of the first division, a manager who is about to be informed has the unavoidable incentive to inefficiently bias the resource allocation toward that division in order to increase the expected realization of the signal and in that way increase the expected market price of the firm. This bias in resource allocation is limited, because it decreases the firm's expected cash flows and hence is costly to the manager. The more likely disclosure is, the larger are the bias and the implied production distortion, and the lower is the operating value of information.[12] In some cases, the production distortion is even larger than the contribution of the information to the production process, resulting in a negative operating value of information (i.e., $\delta < 0$). Lemma 4 formally characterizes the manager's resource allocation strategy for any exogenously given disclosure strategy:

Lemma 4: Suppose a given information acquisition intensity, π. Then, for any given disclosure intensity, τ, there exists a unique operating value of information, δ. When $0 < \omega \leq 1$, δ is decreasing in τ, reaching a maximum of $\delta^B = \mu(inf, r^{FB}(inf)) - \mu(ui, r^{FB}(ui)) \geq 0$ for $\tau = 0$, and can be negative for sufficiently high τ. When $\omega = 0$, $\delta = \delta^B$ independently of τ.

It follows from Lemma 4 that possession by the manager of unbalanced private information that can be credibly disclosed is a cause of production inefficiency.[13] This result is consistent with Holmstrom and Milgrom (1991), who show that managers cannot avoid the inefficient allocation of excessive amounts of resources to those tasks that have the greatest impact on observable performance measures. However, unlike Holmstrom and Milgrom (1991) and subsequent studies (e.g., Feltham and Xie 1994; Zhang 2003; Hughes et al. 2005), which analyze the adverse impact of information imbalance on production activities within moral hazard settings with mandatory disclosure, disclosure in our setting is under the manager's discretion.[14] Our setting, therefore, introduces an additional layer of analysis and yields further insights, exploring the impact of information imbalance on managerial discretionary disclosure strategies, via its already identified distorting effect on operating strategies. Described differently, in our model, not only does the disclosure strategy affect the resource allocation strategy, but also it is affected by that strategy. In the absence of disclosure, investors are unable to precisely identify the information status of the manager, so the firm's market price incorporates the operating value of information, δ, only in expectations. On the other hand, when disclosure occurs, it unequivocally reveals the informed status of the manager and the implied production distortion, resulting in a market price that fully reflects the inferred operating value of information. Thus, as formally described in Lemma 5, the lower the operating value of information, the lower are the incentives for an informed manager to provide disclosure. This implies that by reducing the operating value of information, information imbalance endogenously generates disclosure costs that reduce the disclosure intensity.[15]

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[12] The largest production distortion occurs when disclosure is always anticipated ($\tau = 1$). This is the case, for example, when disclosure is mandatory or when the manager commits to disclose. On the other hand, if the manager never possesses private information ($\pi = 0$), or if disclosure is prohibited ($\tau = 0$), there will be no production distortions.

[13] While disclosure is the cause of production inefficiency in the circumstances depicted in our model, Lanen and Verrecchia (1987) and Pae (2002) demonstrate scenarios where the opposite could occur. There, an observable operating decision serves as a noisy manageable substitute for unfavorable disclosure, so that the absence of disclosure (rather than its presence) is the reason for making the inefficient operating decision in anticipating the inferences of investors about the withheld information.

[14] For a variety of other real effects of mandatory disclosure, see Kanodia (1980), Stein (1989), Kanodia and Mukherji (1996), Kanodia and Lee (1998), Melumad et al. (1999), Kanodia et al. (2000), and Kanodia et al. (2004).

[15] Note that disclosure costs arise only when $0 < \pi < 1$. If the manager never possesses private information ($\pi = 0$), then there will be no disclosure and no production distortion. On the other hand, if the manager commits to acquiring information, and thus $\pi = 1$, then production distortion does occur, but it is in any case anticipated by the market, so disclosure is costless.

Lemma 5: Suppose a given information acquisition intensity, π. Then, for any given operating value of information, δ, there exists a unique disclosure intensity, τ. For any $0 \leq \omega \leq 1$, τ is increasing in δ, reaching a maximum of τ^B when $\delta = \delta^B$.

While Lemma 4 characterizes the manager's resource allocation strategy for any exogenously given disclosure strategy, Lemma 5 characterizes the manager's disclosure strategy for any exogenously given resource allocation strategy. Taken together, Lemmata 4 and 5 highlight the role that the imbalance in information plays in generating a mutual dependence between the resource allocation and disclosure decisions. Consistent with prior literature, Lemma 4 indicates that disclosure of unbalanced information is the cause of a production distortion that reduces the operating value of information. Lemma 5 implies that the reduction in the operating value of information makes disclosure more costly and thus leads to a reduction in the disclosure intensity as well. This interaction results in the unique equilibrium presented in Proposition 1.

Proposition 1: Suppose a given information acquisition intensity, π. Then, there exists a unique equilibrium. The equilibrium resource allocation of an uninformed manager is always efficient, while that of an informed manager is inefficient, unless $\omega = 0$, so that the operating value of information is $\delta \leq \delta^B$. The equilibrium disclosure strategy is upper-tailed with disclosure intensity $\tau \leq \tau^B$. Both δ and τ are decreasing in ω, where an equilibrium of $\delta = \delta^B$ and $\tau = \tau^B$ is obtained if and only if $\omega = 0$.

According to Proposition 1, in the presence of unbalanced information, the interaction between the operating and disclosure strategies results in a production distortion and a reduced disclosure intensity. The magnitude of both the production distortion and the reduction in the disclosure intensity is positively related to the extent of imbalance in the information. In particular, Proposition 1 yields the empirical prediction that firms with more diversity in their operations, which are usually prone to more information imbalance, are more likely to distort their resource allocation decisions and will consequently be reluctant to provide voluntary disclosure.

The results of Proposition 1 are illustrated in Figure 2. When information is unbalanced ($\omega > 0$), the decreasing solid line, denoted by $\delta(\tau)$, describes the operating value of information for any given level of disclosure intensity, as implied by Lemma 4. The increasing line, denoted by $\tau(\delta)$, describes the disclosure intensity for any given level of operating value of information, as implied by Lemma 5.[16] Since the production line, $\delta(\tau)$, is strictly decreasing, whereas the disclosure line, $\tau(\delta)$, is strictly increasing, they intersect only once, and their intersection point, *UB*, represents the unique equilibrium.[17] As the information becomes more balanced (i.e., ω decreases), the operating value of information becomes less sensitive to the level of the disclosure intensity, as described by the dotted line $\delta'(\tau)$, whose slope is not as steep as that of the line $\delta(\tau)$. So, the resulting equilibrium point, *UB'*, involves

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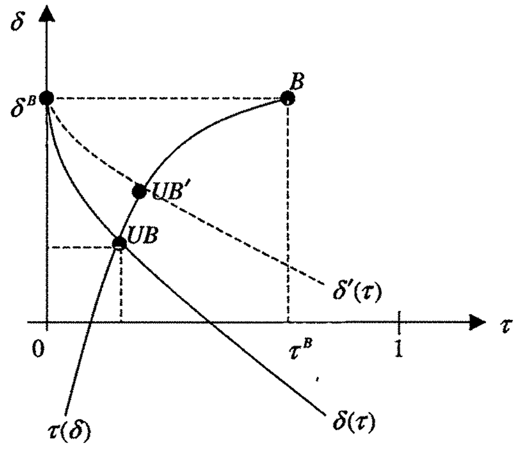
[16] We note that while the disclosure line, $\tau(\delta)$, depends upon the information acquisition intensity, π, the production line, $\delta(\tau)$, is independent of π. This observation plays an important role in the analysis of the following section where π is endogenous.

[17] We note that the operating value of information, δ, at the equilibrium point, *UB*, can be either positive or negative.

FIGURE 2
Equilibrium Operating and Disclosure Strategies



This figure illustrates the equilibrium operating and disclosure strategies for a given information acquisition intensity, π, in the space of all possible pairs of operating value of information (δ) and disclosure intensity (τ). When information is unbalanced ($\omega > 0$), the decreasing solid line, denoted by $\delta(\tau)$, describes the operating value of information for any given level of disclosure intensity (Lemma 4). The increasing line, denoted by $\tau(\delta)$, describes the disclosure intensity for any given level of operating value of information (Lemma 5). The intersection point, *UB*, of these two lines describes the equilibrium in the case of unbalanced information (Proposition 1). As the information becomes more balanced (i.e., ω decreases), the operating value of information becomes less sensitive to the level of the disclosure intensity, as described by the decreasing dotted line $\delta'(\tau)$, whose slope is not so steep as that of the line $\delta(\tau)$. So, the resulting equilibrium point, *UB'*, involves a higher operating value of information and a higher disclosure intensity. Under the benchmark case of balanced information ($\omega = 0$), the equivalent to the line $\delta(\tau)$ is the horizontal line where $\delta = \delta^B \geq 0$. Therefore, the point *B* describes the equilibrium in the benchmark case of balanced information.

a higher operating value of information and a higher disclosure intensity. Under the benchmark case of balanced information ($\omega = 0$), resource allocation is always efficient, so the production line $\delta(\tau)$ coincides with the horizontal line $\delta = \delta^B$, and the equilibrium is obtained at the point *B*, where there is no production distortion and the disclosure intensity is maximal.

In analyzing the equilibrium, we put special emphasis on the impact of the information imbalance, ω, showing that both the operating value of information, δ, and the disclosure intensity, τ, are negatively related to ω. We now examine the relations between the equilibrium outcomes and the remaining parameters of the model. Most of these relations are clear-cut, as detailed in Corollary 1, but some of them are inconclusive due to the existence of multiple countervailing forces.

Corollary 1: The operating value of information, δ, is decreasing in π and σ_2, and increasing in η, λ_1, λ_2, and σ_ε. The disclosure intensity, τ, is increasing in π, η, λ_1, and λ_2.

Consider first an increase in the probability π assigned by the market to the manager's endowment with private information. Consistent with Dye (1985) and Jung and Kwon

(1988), the disclosure intensity increases as investors are more convinced about the endowment of the manager with private information. The increase in the disclosure intensity intensifies the production distortion and therefore decreases the operating value of information. Consider now an increase in η, which suggests that the manager assigns a higher weight to the firm's cash flows and a lower weight to its market price. Examples of entities with a high value of η include private firms, firms that are held by institutional investors (e.g., private equity or hedge funds), and firms that do not use stock-based compensation. We predict, based on Corollary 1, that among such firms, both production and disclosure distortion will be less frequent or severe due to a reduced propensity to bias resource allocation. Similarly, an increase in either λ_1 or λ_2 obviously increases the operating value of information and thereby increases the disclosure intensity as well. Next, note that a decrease in the noisiness of the signal, σ_ε^2, or an increase in the variability of the second division's cash flow, σ_2^2, enhances the relevance of the manager's private signal. As a result, disclosure has a stronger impact on the firm's market price, so the propensity of the manager to bias resource allocation increases, reducing the operating value of information. The increase in the relevance of the signal increases the disclosure intensity, but the increased production distortion makes the disclosure of the signal more costly and thus has the opposite effect of decreasing the disclosure intensity. Consistent with the existing literature, in most of our numerical analyses the former force dominates, but we are also able to construct examples where the latter force dominates. The effect of an increase in the variability of the first division's cash flow, σ_1^2, is inconclusive not only with respect to the disclosure intensity, but also with respect to the operating value of information. This is because the relevance of the signal is not necessarily increasing in σ_1^2 due to the reporting imbalance. Again, examples exist where the results can go both ways.

V. ANALYSIS OF INFORMATION ACQUISITION STRATEGY

In this section, utilizing our results from the previous section, we move backward and derive the information acquisition strategy. In making the information acquisition decision, the manager faces a trade-off between the benefit from possessing information and the independent cost of acquiring it, so that the information is acquired if and only if its cost does not exceed some threshold $c_0 \in [\underline{c},\bar{c}]$. Similarly to Pae (1999), we cannot rule out the existence of multiple equilibria. However, the analysis in this section sheds light on the properties of the threshold cost, c_0, within each equilibrium.

Observe that information benefits the manager in two ways. First, it can provide an operating advantage that enables her to augment production and increase the firm's expected cash flows. Second, it allows her to use voluntary disclosure to manipulate the investors' expectations about the firm and thereby increase the firm's market price. Therefore, the manager's benefit from possessing information is increasing in both the operating value of information, δ, and the disclosure intensity, τ. Recall now that according to Proposition 1, for any level of information acquisition intensity, π, both the operating value of information, δ, and the disclosure intensity, τ, are decreasing in the extent of imbalance in information. Hence, as shown in Lemma 6, the imbalance in the information decreases the benefit to the manager from possessing the information:

Lemma 6: For any given information acquisition intensity, π, the difference in the expected utility of an informed manager and an uninformed manager is decreasing in ω.

It follows from Lemma 6 that imbalance in information decreases the benefit to the manager from possessing the information, and thus it also decreases the threshold cost, c_0, of acquiring the information. So, the equilibrium information acquisition intensity, π, is decreasing in the extent of imbalance in the information.. As in the previous section, we benchmark our results against the case of balanced information, $\omega = 0$, denoted by the superscript B, where π^B, δ^B, and τ^B are the benchmark information acquisition intensity, operating value of information, and disclosure intensity, respectively.[18] Since the equilibrium information acquisition intensity, π, is negatively related to ω, it never exceeds the benchmark level, π^B. Combining this conclusion with the results presented in Section IV, we complete the characterization of the equilibrium. The equilibrium properties, as presented in Proposition 2, reflect the role that the inherent imbalance in information plays in suppressing the managerial propensity to acquire information and provide voluntary disclosures, via its distorting impact on operating activities.

Proposition 2: In equilibrium, the information acquisition strategy is lower-tailed with an information acquisition intensity $\pi \leq \pi^B$. The equilibrium resource allocation of an uninformed manager is always efficient, while that of an informed manager is inefficient, unless $\omega = 0$, so that the operating value of information is $\delta \leq \delta^B$. The equilibrium disclosure strategy is upper-tailed with disclosure intensity $\tau \leq \tau^B$. Also, π and τ are decreasing in ω, but δ is not necessarily monotonic in ω, where an equilibrium of $\pi = \pi^B$, $\delta = \delta^B$ and $\tau = \tau^B$ is obtained if and only if $\omega = 0$.

Proposition 2 complements the results of Proposition 1 by demonstrating that the production and disclosure distortions caused by the information imbalance diminish the manager's incentives to acquire the information in the first place. By creating both production and disclosure distortions, the information imbalance reduces the operating advantage of the information and the value of the disclosure option. That is, when the information is unbalanced, it becomes less valuable to the manager and therefore less likely to be acquired. Supplementing the empirical predictions emanating from Proposition 1, we also predict that firms with more diversified operations will be less likely to join trade associations that serve to collect and share information among their members.

The suppressing effect of the information imbalance on the propensity to acquire information, via its impact on the operating and disclosure decisions, has implications for the operating and disclosure decisions. As information acquisition becomes less likely, the manager can better hide behind the cover of not possessing information in order to avoid unfavorable disclosure, and thus her propensity to provide voluntary disclosure is further reduced. In other words, when the information endowment is endogenously derived, information imbalance creates an environment where two effects combine to reduce the manager's incentives to provide voluntary disclosure. First, disclosure becomes costly, because it resolves the uncertainty about the information endowment and thereby reveals the implied production distortion. Second, the manager is better able to pretend to be uninformed, because of the lower likelihood of acquiring information. Unlike the first-mentioned effect concerning disclosure, which has been already explored in the previous section, the second arises due to the endogenous derivation of the information acquisition decision. Hence, by endogenously deriving the information endowment, we are able to further reinforce the suppressing impact of the information imbalance on the manager's propensity to provide voluntary disclosure. However, this intensification in the disclosure distortion due to the endogenous information endowment has a moderating effect on the production distortion. Hence, while the reductions in both the information acquisition intensity and the disclosure intensity are positively related to the extent of imbalance in information, this is not necessarily the case with respect to the production distortion. Consistent with the intuition drawn from Holmstrom and Milgrom (1991) and subsequent papers, most of our numerical analyses show that the magnitude of the production distortion is positively related to the extent of the information imbalance, but we are also able to construct examples where this relationship is non-monotonic. To illustrate why our result here differs from that of the previous section, where π was exogenously given, we refer again to Figure 2. Since π is now endogenously derived and negatively related to the information imbalance, not only does the information imbalance shift the production line downward, but also it shifts the disclosure line to the left. Hence, unlike the analysis in the previous section, because of the shift to the left of the disclosure line, the magnitude of the production distortion is not necessarily monotonically increasing in the extent of imbalance in information. Nevertheless, the equilibrium must involve a lower operating value of information compared to the benchmark of balanced information.

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[18] While the information acquisition intensity is irrelevant for determining the benchmark operating value of information, δ^B, it is an important determinant of the benchmark disclosure intensity, τ^B. Hence, in this section we use the notation τ^B to denote the benchmark disclosure intensity for an information acquisition intensity of π^B, whereas in the previous section the same notation serves to represent the benchmark disclosure intensity for the exogenously given information acquisition intensity π.

The results of Proposition 2 are of particular interest when considering the special case of $\delta^B \geq \bar{c}$. In this case, information is value-enhancing in the sense that its expected operating advantage always exceeds its cost. Here, our benchmark of balanced information yields a unique equilibrium with first-best production ($\delta = \delta^B$), full information acquisition ($\pi^B = 1$), and full disclosure ($\tau^B = 1$). However, imbalance in the information might lead to partial information acquisition accompanied by a partially revealing disclosure strategy and inefficient production. The imbalance in information, which leads to suboptimal production ($\delta < \delta^B$), makes information less valuable and thereby reduces the propensity to acquire it. Consequently, there could be a deviation from the benchmark of full information acquisition to an equilibrium with partial information acquisition ($\pi < \pi^B = 1$), implying that imbalance in information might create another kind of inefficiency by preventing the acquisition of value-enhancing information with a cost that is low relative to its potential benefit. This prediction is interesting in light of Pae's (1999) observation regarding the inevitable incentives of managers to acquire value-distorting information. Furthermore, when acquiring the information, the manager adopts a partial rather than a full disclosure strategy ($\tau < \tau^B = 1$). This is because the uncertain information acquisition makes it possible for the manager to hide behind the cover of not possessing information and also confronts her with the disclosure-associated cost of revealing the production distortion. Information imbalance therefore endogenously generates an environment where investors are uncertain about the manager's information endowment (Dye 1985), $\pi < \pi^B = 1$, and disclosure is costly (Verrecchia 1983), $\delta < \delta^B$. By endogenously creating both uncertainty about the information endowment and disclosure costs, the imbalance in value-enhancing information acts as a trigger for a move from a fully revealing equilibrium to a partially revealing one.

We use a numerical example to demonstrate our results. Assume an identical Cobb-Douglas production function for the two divisions, $f_1(ui,x) = f_2(ui,x) = (400x)^{0.8}$, a uniformly distributed information acquisition cost over the support $[\underline{c} = 0, \bar{c} = 10]$, and the following set of parameters: $\lambda_1 = 0.05$, $\lambda_2 = 0.1$, $\eta = 0.4$, $\rho = 0.6$, $\sigma_1 = 5$ and $\sigma_2 = 15$.

We derive the manager's equilibrium strategies under two alternative assumptions about the information structure: balanced ($\omega = 0$) and unbalanced ($\omega = 0.8$) information. Under the benchmark case of balanced information, the resource allocation is always efficient, yielding a first-best expected output of about 138.6 when the manager is uninformed and a higher first-best of 149.2 when the manager is informed, so the benchmark operating value of information is $\delta^B = 10.6$. Since the cost of the information does not exceed its operating advantage ($\bar{c} = 10 < \delta^B = 10.6$), it is always beneficial for the manager to acquire the information, so the benchmark information acquisition intensity is $\pi^B = 1$. As investors are certain about the information endowment and disclosure is costless, the benchmark also yields full disclosure and the benchmark disclosure intensity is $\tau^B = 1$. On the other hand, when the information is unbalanced ($\omega = 0.8$), an informed manager over-allocates resources to the first division, yielding suboptimal expected output of about 137.4, which is below even the first-best of the uninformed manager (138.6). This implies a negative operating value of information, $\delta = -1.2$. As information becomes value-distorting, the propensity of the manager to acquire it decreases significantly. As a result, instead of full information acquisition, we get a much lower information acquisition intensity of $\pi = 0.42$, where information is acquired only if its cost is below the threshold of $c_0 = 4.2$. Therefore, with probability 0.58, there is an inefficiency of 3.5 because of not acquiring information that has the potential to contribute a value of $\delta^B = 10.6$ to the expected production at an average cost of $(c_0 + \bar{c})/2 = (4.2 + 10)/2 = 7.1$. With probability 0.42, there is an inefficiency of $\delta^B - \delta = 10.6 - (-1.2) = 11.8$ because of the production distortion in the case of acquiring the information. Averaging these two inefficiencies, the imbalance in information results in an average efficiency loss of $0.58 \cdot 3.5 + 0.42 \cdot 11.8 = 7$ (about 5 percent of the first-best value). Furthermore, being able to pretend to be uninformed because information endowment is uncertain, and knowing that disclosure is costly as it reveals the production distortion, the informed manager is considerably less motivated to provide disclosure, resulting in a disclosure intensity of $\tau = 0.48$ instead of full disclosure. That is, conditioned on acquiring the information, the imbalance in information dramatically reduces the probability of disclosure occurrence from 1 to 0.48. The reduction from 1 to $0.42 \cdot 0.48 = 0.20$ in the unconditional probability of disclosure occurrence is even steeper.

Having discussed the sensitivity of the equilibrium outcomes to the central modeling parameter ω, we complete the analysis by discussing the sensitivity of the equilibrium outcomes to changes in the other parameters of the model. It appears that some of the relationships between the parameters and the equilibrium outcomes are subject to countervailing economic forces and are thus inconclusive. Clear-cut results are obtained only when considering the impact of the parameters η, λ_1, and λ_2 on the information acquisition intensity and on the disclosure intensity. These results are presented in Corollary 2:

Corollary 2: The information acquisition intensity, π, and the disclosure intensity, τ, are increasing in η, λ_1, and λ_2.

To understand the results of Corollary 2, recall that according to Corollary 1, an increase in each of the parameters η, λ_1, and λ_2 results in an increase in both the operating value of information and the disclosure intensity, enhancing the benefit to the manager from possessing information (Lemma 6) and her propensity to acquire the costly information. The increase in the information acquisition intensity further increases the disclosure intensity, but has an opposite downward effect on the operating value of information, so the overall impact on the operating value of information is inconclusive. For all other parameters (σ_1,σ_2,σ_ε), recall our discussion in the previous section about the existence of multiple forces, which leads here to an inconclusive impact on all three equilibrium outcomes where the results can go both ways.

VI. CONCLUDING REMARKS

In this paper, we integrate voluntary disclosure into the overall corporate activities and strategies. Our study is based on the notion that there is an inherent variation in the precision with which different activities can be measured or communicated. As a result, information produced and reported by firms normally provides only a partial and unbalanced reflection of their economic fundamentals, putting different levels of emphasis on different aspects of their operating activities. We identify this embedded imbalance in information as the source of an interaction between operating and discretionary disclosure strategies, and thereby also as an important determinant of the information acquisition strategy. We show that the imbalance in information, via its distorting effect on production, reduces the managerial propensity to acquire information and provide voluntary disclosures of acquired information.

While our analysis applies to a wide range of business contexts, it pertains especially to firms with diversified operations, such as firms that operate in several industries or markets, firms with operations that involve a multiplicity of tasks, and firms engaged in projects with different time horizons. In such diversified business environments, information is most likely to be unbalanced and is also expected to be sensitive to resource allocations, and thus the distortions in production, information acquisition, and voluntary disclosure are expected to be more salient. Our discussion in Sections IV and V provides several empirical predictions along these lines.

Obviously, the relationships between discretionary disclosure decisions and other managerial decisions are much richer than those we were able to consider in our model. We believe that there is considerable potential for future research in exploring many other sources of such relationships within multi-decision settings. Extensions could involve settings with several different concurrent decisions, as in our current paper, or settings with repeated sequential decisions (e.g., Einhorn and Ziv 2007).

APPENDIX
HIGHLIGHTS OF THE PROOFS

Throughout the Appendix, let z and Φ be the probability density function and the cumulative distribution function for a standard normal variable, respectively. Also, for any random variable V that is normally distributed with mean m and standard deviation s, let $\hat{V}$ be the standard normal variable $\frac{V-m}{s}$. Similarly, given a realization v of the variable V, let $\hat{v}$ be the realization $\frac{v-m}{s}$ of the variable $\hat{V}$. Besides Lemmata 1–6, the proofs are based on an additional lemma that is stated and proved below.

Lemma A: (i) The function $F(x) = x + \frac{z(x)}{\Phi(x)}$ is continuous and increasing in $x \in \Re$, where $\lim_{x\to-\infty} F(x) = 0$ and $\lim_{x\to\infty} F(x) = \infty$;

(ii) The function $G(\pi,x) = \frac{\pi}{1-\pi}(x\Phi(x) + z(x)) + x$ is continuous and increasing in $x \in \Re$ and in $\pi \in (0,1)$, where $\lim_{x\to-\infty} G(\pi,x) = -\infty$ and

$\lim_{x \to \infty} G(\pi,x) = \infty$; and

(iii) The function $H(x) = x\Phi(x) + z(x) - x$ is continuous and decreasing in $x \in \Re$.

Proof of Lemma A

Being a composition of continuous functions, the function F is obviously continuous. For the monotonicity, recall that $z'(x) = -xz(x)$ and recall also Sampford (1953) who shows:

$$\forall x \in \Re\text{: } 0 < \frac{z(x)}{1 - \Phi(x)} \left(\frac{z(x)}{1 - \Phi(x)} - x \right) < 1.$$

Thus:

$$\begin{aligned} F'(x) &= 1 + \frac{z'(x)\Phi(x) - z(x)\Phi'(x)}{\Phi^2(x)} = 1 - \frac{z(x)}{\Phi(x)} \left(\frac{z(x)}{\Phi(x)} + x \right) \\ &= 1 - \frac{z(-x)}{1 - \Phi(-x)} \left(\frac{z(-x)}{1 - \Phi(-x)} - (-x) \right) > 0. \end{aligned}$$

Now, based on $\lim_{x \to -\infty} z(x) = \lim_{x \to \infty} z(x) = \lim_{x \to -\infty} \Phi(x) = 0$ and $\lim_{x \to \infty} \Phi(x) = 1$, and using l'Hopital's rule repeatedly, $\lim_{x \to -\infty} x\Phi(x) = \lim_{x \to -\infty} \frac{\Phi(x)}{1/x} = \lim_{x \to -\infty} \frac{z(x)}{-(1/x^2)} = \lim_{x \to -\infty} \frac{x^2}{-(1/z(x))} = \lim_{x \to -\infty} \frac{2x}{z'(x)/z^2(x)} = \lim_{x \to -\infty} - 2z(x) = 0$, $\lim_{x \to -\infty} F(x) = \lim_{x \to -\infty} \frac{x\Phi(x) + z(x)}{\Phi(x)} = \lim_{x \to -\infty} \frac{\Phi(x) + xz(x) + z'(x)}{z(x)} = \lim_{x \to -\infty} \frac{\Phi(x)}{z(x)} = \lim_{x \to -\infty} \frac{z(x)}{z'(x)} = \lim_{x \to -\infty} -\frac{1}{x} = 0$, $\lim_{x \to \infty} F(x) = \lim_{x \to \infty} x + \frac{\lim_{x \to \infty} z(x)}{\lim_{x \to \infty} \Phi(x)} = \infty$.

Again, being a composition of continuous functions, the function G is obviously continuous. For the monotonicity, observe:

$$\begin{aligned} \frac{dG(\pi,x)}{dx} &= \frac{\pi}{1 - \pi} (xz(x) + \Phi(x) + z'(x)) + 1 \\ &= \frac{\pi}{1 - \pi} (xz(x) + \Phi(x) - xz(x)) + 1 = \frac{\pi}{1 - \pi} \Phi(x) + 1 > 0 \end{aligned}$$

and:

$$\frac{dG(\pi,x)}{d\pi} = \frac{1}{(1 - \pi)^2} (x\Phi(x) + z(x)) > 0.$$

Now, based on $\lim_{x \to -\infty} z(x) = \lim_{x \to \infty} z(x) = \lim_{x \to -\infty} x\Phi(x) = 0$ and $\lim_{x \to \infty} \Phi(x) = 1$, we get $\lim_{x \to -\infty} G(\pi,x) = -\infty$ and $\lim_{x \to \infty} G(\pi,x) = \infty$.

As before, the function H is continuous, because it is a composition of continuous functions. For the monotonicity, observe:

$$H'(x) = xz(x) + \Phi(x) + z'(x) - 1 = xz(x) + \Phi(x) - xz(x) - 1 = \Phi(x) - 1 < 0.$$

Proof of Lemma 1

The lower-tailed form of the information acquisition strategy follows from the fact that the benefit from being informed is independent of the cost of acquiring the information.

Proof of Lemma 2

For any information status, $a \in \{inf, ui\}$, the resource allocation $r^{FB}(a)$ that maximizes the firm's expected cash flows, $E[CF(a, r^{FB}(a))] = f_1(a, r^{FB}(a)) + f_2(a, 1 - r^{(FB}(a))$, must satisfy the first-order condition: $\frac{f_1'(a, r^{FB}(a))}{f_2'(a, 1 - r^{FB}(a))} = 1$. As the functions f_1 and f_2 are increasing and concave, there is a unique solution $r^{FB}(a)$ to the first-order condition that represents the first-best resource allocation given the information status a. If $a = ui$, then the manager cannot affect the market price of the firm, so her objective is reduced to maximizing the firm's expected cash flows, implying that $R(ui) = r^{FB}(ui)$.

Proof of Lemma 3

The upper-tailed form of the disclosure strategy follows from the fact that the price under disclosure $P(dis, s)$ is an increasing function of the signal's realization s (due to the positive correlation between the signal and the cash flows), while the price in the absence of disclosure $P(nd, s)$ is constant and independent of s.

Proof of Lemma 4

According to Lemma 2, an uninformed manager chooses the first-best resource allocation, $R(ui) = r^{FB}(ui)$. Moving now to deriving the optimal resource allocation of an informed manager, recall that the joint distribution of the firm's cash flows and the signal is normal, so the firm price is a linear in the signal, $P(dis, s) = \alpha + \beta s$ and $P(nd, s) = \gamma$, where $\alpha, \beta, \gamma \in \Re$. The positive correlation between the signal and the cash flows implies $\beta > 0$. Specifically, $\beta = \frac{\sigma_1^2 + (1 - \omega)\sigma_2^2}{\sigma_S^2} = \frac{\sigma\rho}{\sigma_S}$. Recall also that according to Lemma 3, the disclosure strategy is upper-tailed with a threshold s_0. Thus, an informed manager chooses the resource allocation, r, to maximize $(1 - \eta)(\tau(\alpha + \beta E[S(r))|S(r) \geq s_0]) + (1 - \tau)\gamma) + \eta E[CF(inf, r)]$, where $1 - \Phi(\hat{s}_0) = \tau$. Using $E[CF(inf, r)] = f_1(inf, r) + f_2(inf, 1 - r)$ and $E[S(r)|S(r) \geq s_0] = f_1(inf, r) + (1 - \omega)f_2(inf, 1 - r) + \frac{z(\hat{s}_0)}{1 - \Phi(\hat{s}_0)}\sigma_S$, the manager chooses r to maximize $((1 - \eta)\tau\beta + \eta)f_1(inf, r) + ((1 - \eta)\tau\beta(1 - \omega) + \eta)f_2(inf, 1 - r)$. The first-order condition is:

$$\frac{f_1'(inf, r)}{f_2'(inf, 1 - r))} = \frac{(1 - \eta)\tau\beta(1 - \omega) + \eta}{(1 - \eta)\tau\beta + \eta}. \tag{1}$$

As $0 < \eta < 1$ and $\tau, \beta > 0$, the right side of Equation (1) is less than 1 for any $0 < \omega \leq 1$ and is exactly 1 for $\omega = 0$. This, together with Lemma 2, implies $r \geq r^{FB}(inf)$ and $\delta \leq \delta^B$, where equality holds if and only if $\omega = 0$. Also, while the right side of Equation (1) is independent of τ for $\omega = 0$, it is decreasing in τ for any $0 < \omega \leq 1$. Thus, if $\omega = 0$, then $\delta = \delta^B$ independently of τ, and otherwise $-\delta$ is decreasing in τ. Regardless of ω, as τ converges to zero, the right side of Equation (1) converges to 1, so $\lim_{\tau \to 0} r = r^{FB}(inf)$ and $\lim_{\tau \to 0} \delta = \delta^B$.

Proof of Lemma 5

According to Lemma 3, the manager's disclosure strategy is upper-tailed. To derive the disclosure threshold level s_0, denote $\bar{c} = E[C|C \leq c_0]$, where c_0 is the threshold cost of acquiring information implied by π, and observe that:

$$P(dis,s) = E[CF(inf,R(inf))|S(R(inf)) = s] - \bar{c} = \mu(inf,R(inf)) + \sigma\rho\hat{s} - \bar{c}$$

and:

$$\begin{aligned} P(nd,s) &= \frac{1-\pi}{1-\pi+\pi(1-\tau)} E[CF(ui,R(ui))] \\ &\quad + \frac{\pi(1-\tau)}{1-\pi+\pi(1-\tau)} (E[CF(inf,R(inf))|S(R(inf)) \leq s_0] - \bar{c}) \\ &= \frac{1-\pi}{1-\pi+\pi\Phi(\hat{s}_0)} \mu(ui,R(ui)) \\ &\quad + \frac{\pi\Phi(\hat{s}_0)}{1-\pi+\pi\Phi(\hat{s}_0)} \left(\mu(inf,R(inf)) - \sigma\rho \cdot \frac{z(\hat{s}_0)}{\Phi(\hat{s}_0)} - \bar{c}\right) \\ &= \mu(inf,R(inf)) - \bar{c} - \frac{1-\pi}{1-\pi+\pi\Phi(\hat{s}_0)} (\delta - \bar{c}) - \sigma\rho \cdot \frac{\pi z(\hat{s}_0)}{1-\pi+\pi\Phi(\hat{s}_0)}. \end{aligned}$$

Given $P(dis,s_0) = P(nd,s_0)$, we get $\hat{s}_0 + \frac{\pi z(\hat{s}_0)}{1-\pi+\pi\Phi(\hat{s}_0)} = -\frac{1-\pi}{1-\pi+\pi\,\Phi(\hat{s}_0)} \cdot \frac{\delta - \bar{c}}{\sigma\rho}$. So, if $\pi = 1$, we get $F(\hat{s}_0) = 0$, which implies $s_0 = -\infty$ and $\tau = 1$ based on Lemma A. For any $0 \leq \pi < 1$, we get the equation:

$$G(\pi,\hat{s}_0) = -\frac{\delta - \bar{c}}{\sigma\rho}. \tag{2}$$

By Lemma A, Equation (2) has a unique solution $\hat{s}_0$, which is decreasing in δ. Accordingly, $\tau = 1 - \Phi(\hat{s}_0)$ is increasing in δ.

Proof of Proposition 1

Based on the proofs of Lemmata 4 and 5, in equilibrium, δ and τ must satisfy both Equation (1) and Equation (2). In the benchmark case of $\omega = 0$, the unique solution to both equations is $\delta = \delta^B$ and $\tau = \tau^B$. Suppose now that $\omega > 0$. In this case, Equation (1) describes δ as a strictly decreasing function of τ, while Equation (2) describes τ as a strictly increasing function of δ. In particular, note that $\tau = 0$ implies $\delta = \delta^B$ according to Equation (1), but $\delta = \delta^B$ implies $\tau = \tau^B > 0$ according to Equation (2). Also, $\tau = \tau^B > 0$ implies $\delta < \delta^B$ according to Equation (1), but such δ implies $\tau < \tau^B$ according to Equation (2). Hence, the two functions described by Equations (1) and (2) must intersect in a unique pair of δ and τ that constitutes the equilibrium. As τ must be positive, Equation (1) implies that $\delta < \delta^B$. Now using Equation (2), it follows that $\tau < \tau^B$.

The right side of Equation (1) is decreasing in ω, reaching a maximum of 1 at $\omega = 0$. Thus, the operating value of information, δ, is decreasing in ω, reaching a maximum of δ^B at $\omega = 0$. Since the disclosure intensity, τ, is increasing in δ, it is also decreasing in ω, reaching a maximum of τ^B at $\omega = 0$.

Proof of Corollary 1

The right side of Equation (1) is decreasing in τ, increasing in η, independent of π and decreasing in β, which is decreasing in σ_ε and increasing in σ_2, but could be either decreasing or increasing in σ_1. Thus, δ is decreasing in τ, increasing in η, independent of π, increasing in σ_ε and decreasing in σ_2, but could be either decreasing or increasing in σ_1. Given the structure of the production technology, δ is also increasing in λ_1 and in λ_2.

By Lemma A, the solution $\hat{s}_0$ of Equation (2) is decreasing in δ, independent of η, independent of λ_1, independent of λ_2, decreasing in π, increasing in σ_ε^2 and decreasing in σ_2^2, but could be either increasing or decreasing in σ_1. Thus, τ is increasing in δ, independent of η, independent of λ_1, independent of λ_2, increasing in π, decreasing in σ_ε^2 and increasing in σ_2^2, but could be either increasing or decreasing in σ_1.

The proof now follows by considering the impact on Equation (1) and Equation (2) together.

Proof of Lemma 6

Recall that the firm's market price in the absence of disclosure equals $P(dis,s_0)$ in equilibrium. Accordingly, the manager's expected utility if information is not acquired is $\eta\mu(ui,R(ui)) + (1 - \eta)P(dis,s_0)$. The manager's expected utility if information is acquired is $\eta(\mu(inf,R(inf)) - c) + (1 - \eta)(\tau E[P(dis,S)|S \geq s_0] + (1 - \tau)P(dis,s_0))$. The difference in the expected utility of an informed manager and an uninformed manager is therefore $\Delta = \eta(\delta - c) + (1 - \eta)\tau(E[P(dis,S)|S \geq s_0] - P(dis,s_0))$, which equals $\Delta = \eta(\delta - c) + (1 - \eta)(1 - \Phi(s_0))\rho\sigma\left(\frac{z(s_0)}{1 - \Phi(s_0)} - s_0\right) = \eta(\delta - c) + (1 - \eta)\sigma\rho H(\hat{s}_0)$. This difference is increasing in δ. It is also decreasing in s_0 by Lemma A, and thus increasing in τ. Since δ and τ are both decreasing in ω (Proposition 1), the difference Δ is decreasing in ω.

Proof of Proposition 2

According to the proof of Lemma 6, the difference in the expected utility of an informed manager and an uninformed manager is $\eta(\delta - c) + (1 - \eta)\sigma\rho H(\hat{s}_0)$. This difference equals zero at the threshold cost $c = c_0$, implying that:

$$\eta c_0 = (1 - \eta)\sigma\rho H(\hat{s}_0) + \eta\delta. \tag{3}$$

It follows from Lemma 6 that c_0 is decreasing in ω, and thus π is also decreasing in ω where $\pi \leq \pi^B$. Using Proposition 1, and the positive relationship between τ and π, τ is also decreasing in ω, where an equilibrium of $\pi = \pi^B$, $\delta = \delta^B$ and $\tau = \tau^B$ is obtained if and only if $\omega = 0$. To demonstrate that δ might be non-monotonic in ω, consider the following example. Assume an identical Cobb-Douglas production function for the two divisions, $f_1(ui,x) = f_2(ui,x) = (400x)^{0.8}$, and the following set of parameters: $\lambda_1 = 0.1$, $\lambda_2 = 0.2$, $\eta = 0.4$, $\rho = 0.6$, $\sigma_1 = 5$ and $\sigma_2 = 15$, $\underline{c} = 0$, $\bar{c} = 20$. When the parameter ω

increases from 0.755 to 0.760, the equilibrium operating value of information δ also increases from 5.66 to 5.81. However, when ω further increases from 0.760 to 0.765, δ deceases from 5.81 to 5.77.

Proof of Corollary 2

By Corollary 1, for any given π, both δ and τ are increasing in η, λ_1 and λ_2. Lemma 6 implies that π is increasing in δ and τ, and thus π is also increasing in η, λ_1 and λ_2. Based again on Corollary 1, τ is increasing in π, and thus is increasing in η, λ_1 and λ_2 even when π is endogenously derived.

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The Influences of Financial Statement Recognition and Analyst Coverage on the Market's Valuation of R&D Capital

Michael D. Kimbrough
Harvard University

ABSTRACT: Statement of Financial Accounting Standards No. 141 (SFAS No. 141)'s requirement that an acquirer in a business combination estimate the fair value of the target's separately identifiable assets and liabilities (including research and development capital) provides a rare occasion where estimated fair values of U.S. firms' research and development (R&D) capital based on private information about their R&D activities are publicly disclosed. The degree to which equity values impound the estimated fair values of R&D depends upon the extent to which the private information implicit in the R&D estimates is reflected in investor expectations. Financial statement recognition of R&D capital and analyst activities have been cited as alternative mechanisms by which private information about firms' R&D activities can be revealed to investors. I investigate the degree to which both mechanisms lead to the public revelation of the private information implicit in the R&D fair value estimates by examining whether financial statement recognition of R&D assets by the target prior to the merger announcement and/or analyst coverage of a target prior to the merger announcement influence the degree to which the target's pre-merger announcement equity value reflects the acquirer's subsequently disclosed estimate of the fair value of the target's R&D capital. I find that the degree to which a target's pre-merger announcement equity value reflects the estimated fair value of its R&D capital is increasing in the amount of R&D-related intangibles captured in the target's pre-merger announcement balance sheets and in the number of analysts covering the target prior to the merger announcement. This evidence is consistent with the notion that both financial statement recognition and analysts' private information search activities lead to the revelation of private information about the value of R&D assets that investors incorporate into equity values. I further find that the positive relation between analyst following and the market's valuation of R&D capital is strongest for the portion of the estimated fair value of R&D capital that is unrecognized by the target prior to the merger announcement. This finding is consistent with analysts filling in the information gap left by the lack of financial statement recognition. The results of this study confirm the theorized roles of financial

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statement recognition and analyst activities in aiding the market's valuation of intangible assets.

I. INTRODUCTION

The ability of investors to incorporate the fair value of research and development (R&D) capital into equity values is hindered by the inherently uncertain payoffs to R&D investment—which complicates the task of arriving at reliable estimates of the fair value of R&D capital—and by the fact that most of the information needed to evaluate a firm's R&D activities is held privately. Nevertheless, prior research by Lev and Sougiannis (1996) demonstrates that the market implicitly capitalizes, at least partially, the future benefits associated with R&D investment. There is little empirical evidence on the mechanisms by which investors, despite the challenges they face, are able to incorporate the value of R&D capital into equity values. This study examines two potential mechanisms that have been cited as alternative means by which private information about firms' R&D activities can be revealed to investors: financial statement recognition of R&D assets and the private information search activities of analysts.

Examination of the impact of financial statement recognition on the investors' valuation of R&D capital is prompted by increasing calls for greater recognition of intangible assets such as R&D capital in order to facilitate the market's ability to fully appreciate such assets (Lev and Zarowin 1999; Daum 2002; Lev 2002). Those who advocate broader recognition of R&D assets argue that lack of financial statement recognition of R&D assets limits the informativeness of financial statements about such assets, thereby impeding investors' ability to fully appreciate their value.[1] Although U.S. accounting standards generally prohibit the recognition of R&D assets due to reliability concerns resulting from the uncertain payoffs to R&D investments (FASB 1974), the limited occasions where such assets are recognized provide the opportunity to formally investigate whether recognition of R&D assets aids investors in incorporating the fair value of R&D capital into equity values.

Examination of the impact of analyst following on the market's valuation of R&D capital is motivated by Barth et al.'s (2001) evidence that analysts cover R&D-intensive firms in greater numbers, presumably because the inherent uncertainty of R&D investments combined with the requirement to expense most R&D costs creates an information void that analysts seek to fill through their private information search activities. While Barth et al. (2001) provide evidence consistent with analysts attempting to fill the information void associated with R&D investment, this study provides evidence on whether coverage by analysts is successful in aiding the market's discovery of and incorporation of the fair value of R&D capital into equity values.

Statement of Financial Accounting Standards No. 141 (SFAS No. 141)'s requirement that an acquirer in a business combination estimate the fair value of the target's separately identifiable assets and liabilities (including research and development capital; FASB 2001a) provides a rare occasion where estimated fair values of U.S. firms' research and development (R&D) capital based on private information about their R&D activities are publicly disclosed. The degree to which the target's equity value prior to the merger announcement impounds the estimated fair value of its R&D capital subsequently disclosed by the acquirer depends upon the extent to which the private information implicit in the R&D estimates is reflected in investor expectations prior to the merger announcement. In order to provide evidence on factors that aid investors' discovery of R&D intangibles, I examine whether financial statement recognition of R&D assets by a target prior to the merger announcement and/or analyst coverage of a target prior to the merger announcement influence the degree to which the target's pre-merger announcement equity value reflects the acquirer's subsequently disclosed estimate of the fair value of the target's R&D capital.

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[1] In a 2002 interview with Juergen Daum, Lev asserted: "GAAP-based financial accounting and reporting produces insufficient information about intangibles, with the result that investors are in the dark."

I obtain estimates of R&D capital for a set of public companies that were acquired by other public companies from July 1, 2001 (the effective date of SFAS No. 141) through December 31, 2004. I relate the target's market capitalization prior to the merger announcement to the estimated fair value of its R&D capital subsequently disclosed by the acquirer as part of its purchase price allocation. I find that the degree to which a target's pre-merger announcement equity value reflects the estimated fair value of its R&D capital is increasing in the amount of R&D-related intangibles captured in the target's pre-merger announcement balance sheets and in the number of analysts covering the target prior to the merger announcement. This evidence is consistent with the notion that both financial statement recognition and analysts' private information search activities lead to the revelation of private information about the value of R&D assets that investors incorporate into equity values. I further find that the positive relation between analyst following and the market's valuation of R&D capital is strongest for the portion of the estimated fair value of R&D capital that is unrecognized by the target prior to the merger announcement. This finding is consistent with analysts filling in the information gap left by the lack of financial statement recognition.

This study makes a number of contributions. First, it confirms the value relevance of R&D capital using fair value estimates based on appraisal techniques that incorporate private information about the target's R&D activities. Second, while prior studies have documented associations between the values of various types of intangible assets and equity values (e.g., Barth et al. 1998; Kallapur and Kwan 2004; Lev and Sougiannis 1996), the means by which the value of these assets becomes incorporated into equity values remains largely unexplored. This study begins to fill that gap. Specifically, this study's evidence that financial statement recognition of R&D assets leads to equity values that incorporate the estimated fair value of R&D capital to a greater degree supports claims that greater recognition heightens investors' appreciation of these assets. At the same time, my finding that analyst coverage is associated with the degree to which equity values impound the estimated fair value of R&D capital and that this association is limited to the portion of the estimated fair value of R&D capital that is unrecognized by the target prior to the merger announcement supports Barth et al.'s (2001) suggestion that analysts can serve as an alternative source of information about R&D capital in the absence of financial statement recognition. This evidence is particularly important given that standard setters are increasingly acknowledging the limitations of modern financial statements in informing users about the value of intangible assets and are exploring ways to overcome these limitations.[2] As standard setters consider ways to either encourage or mandate greater information production about intangible assets, it is important to understand the current information environment surrounding such assets.

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[2] The FASB has acknowledged the potential importance of voluntary disclosure in informing the market about unrecognized intangibles and even created a committee to formulate guidance on what types of disclosure are most informative in this regard (FASB 2001b). The committee was recently disbanded so that the issue could be addressed as part of the larger FASB-IAS convergence project. In addition, the FASB's recently issued Exposure Draft on purchase accounting includes a provision that calls for the capitalization of IPRD as opposed to the current practice of immediately expensing it (FASB 2005). This proposed change suggests an increased willingness by the FASB to permit broader recognition of R&D assets.

This study is closely related to Mohd (2005), who also provides evidence on the informativeness of financial statement recognition of R&D assets by documenting lower levels of information asymmetry (as proxied by bid-ask spreads and share turnover) for software firms that capitalize rather than expense their R&D costs. While Mohd's (2005) evidence of lower bid-ask spreads and higher share turnover for software capitalizers can be interpreted as evidence that the information provided by software capitalization contributes to a higher degree of consensus in investors' beliefs about the payoffs to R&D efforts, the evidence I provide is consistent with recognition also leading to a greater alignment between investors' beliefs and the beliefs of managers who have superior access to private information about their firms' R&D activities. In addition, while Mohd (2005) focuses solely on the impact of software capitalization, I find in supplemental tests that the impact of R&D asset recognition extends beyond software capitalization. Finally, while Mohd (2005) examines the impact of R&D asset recognition in isolation, my examination of analysts as an alternative source of information in addition to financial statement recognition as well as my examination of how these two mechanisms interact permit a fuller picture of the features of the capital market that inform investors about firms' innovative activities.

The remainder of this study proceeds as follows. Section II reviews prior work on the market's valuation of R&D capital, discusses the measurement of the fair value of R&D capital, and develops hypotheses about the roles of financial statement recognition and analyst activities in publicly revealing to investors management's private information related to R&D investment. Section III discusses the sample. Section IV discusses the research design and presents the empirical results. Section V concludes.

II. PRIOR RESEARCH AND HYPOTHESIS DEVELOPMENT

Prior Research

Firms engage in R&D in the hopes of making discoveries that will ultimately lead to new products and operational improvements. Lev and Sougiannis (1996) document a positive association between R&D investments and future operating profit for a large cross-section of firms, indicating that R&D expenditures do confer future benefits *on average*. However, whether an individual firm's research efforts actually result in useful discoveries is not clear at the outset. Moreover, the benefits from any discoveries may be realized only after significant investments of time and money with no guarantee of success. Pharmaceutical companies, for example, often claim that their labs are littered with numerous failed drugs for every blockbuster drug that they successfully bring to market. The risk that R&D may fail to result in the desired innovations makes the payoffs to R&D expenditures highly uncertain. The unpredictable payoffs to R&D expenditures is reflected in the evidence provided by Kothari et al. (2002) that R&D investments are associated with substantially more future earnings variability than capital expenditures. The high degree of uncertainty associated with R&D investments has caused standard setters to require the immediate expensing of R&D investments based on the conclusion that the value of R&D capital can not be measured with sufficient reliability to merit recognition as an asset.

In apparent contradiction of this conclusion, Lev and Sougiannis (1996) find that market prices are positively associated with measures of the unamortized cost of R&D investment calculated based on industry-level amortization rates. Lev and Sougiannis (1996) interpret their findings as evidence that the benefits to R&D are sufficiently reliable to be reflected in market prices. Chan et al. (2001) find that future returns are largely unrelated to historical R&D intensity, consistent with the market incorporating the value of R&D expenditures in a timely manner.

While evidence provided by Lev and Sougiannis (1996) and Chan et al. (2001) suggests that investors recognize the value of R&D investment, there is also substantial evidence that the uncertainty associated with R&D investment combined with the scarcity of information about its value leads to significant information asymmetry both between managers and capital market participants and among capital market participants. Aboody and Lev (2000) provide evidence of substantial returns to insider trading for R&D-intensive firms, consistent with insiders being able to profit from their superior knowledge about the likely payoffs to their firms' R&D investments. Penman and Zhang (2002) document substantial returns to portfolios formed on the basis of the estimated magnitude of unrecorded R&D assets. Chan et al. (2001) document substantial stock return volatility for firms in R&D-intensive industries while Boone and Raman (2001) document higher bid-ask spreads (i.e., lower liquidity) for firms in R&D-intensive industries. Both findings are consistent with diverse investor opinions arising from the lack of transparent disclosure about R&D investments. Barron et al. (2002) document greater analyst forecast dispersion for firms in R&D-intensive industries, which is consistent with diverse analyst opinions for such firms.

The uncertainty associated with R&D investment raises the possibility that equity values do not fully reflect the value of R&D capital. Several studies provide evidence consistent with this possibility. Specifically, Barth and Kasznik (1999) find that R&D-intensive firms are more likely to engage in share repurchases, consistent with the managers of such firms believing their firms to be undervalued by the market. Although they conclude that investors properly evaluate firms' R&D activities *on average*, Chan et al. (2001) provide evidence suggesting that investors tend to unduly discount the R&D investments of firms with poor past financial performance.

The degree to which investors incorporate the fair value of R&D capital into equity values depends upon the extent to which they have access to and incorporate into their expectations private information about the amount, timing, and riskiness of the future payoffs to a firm's R&D activities. Thus, I use the association between observed equity values and the estimated fair value of R&D capital as an indication of the extent of alignment between investors' expectations of the payoffs to a firm's R&D activities and the expectations held by privately informed managers. In the absence of mechanisms that lead to the public revelation of managers' private information about a firm's R&D activities equity values are unlikely to fully reflect the value of an unrecognized asset such as R&D capital (Barth et al. 2001). This study focuses on two mechanisms that have been cited as alternative means by which private information about a firm's R&D activities can be revealed to investors: (1) financial statement recognition of R&D capital and (2) analyst activities. I discuss the means by which both financial statement recognition and analyst coverage can affect the market's valuation of R&D capital as part of the hypothesis development later in this section.

Measures of the Fair Value of R&D Capital

Examination of the factors that affect the market's incorporation of the fair value of R&D capital, of course, requires objective estimates of the fair value of R&D capital. SFAS No. 141's requirement that an acquirer allocate the purchase price of an acquisition to the estimated fair value of the target's identifiable assets and liabilities presents a rare occasion in which estimates of the fair value of R&D are publicly available. Use of appraised values of R&D capital is appealing from a research perspective because it alleviates the need to derive error-laden estimates of R&D capital. The fair value estimates recognized by acquirers as part of purchase accounting are based on appraisal techniques that use private information about the target's R&D efforts to forecast incremental cash flows attributable to R&D investments. Given that payoffs to R&D are largely firm-specific (Aboody and Lev 2000), fair value estimates that incorporate private firm-specific information are likely to be substantially more precise than the measures of unamortized cost based solely on industry-wide amortization rates (a la Lev and Sougiannis 1996). Moreover, given that this study is focused on the mechanisms by which managers' private information about the value of a firm's R&D activities is publicly revealed, use of fair value estimates that incorporate managers' private information is particularly appropriate. Appendix A provides further discussion of typical appraisal techniques used to value R&D capital and Appendix B presents a sample purchase price allocation in which the methods and assumptions used to value in-process R&D (IPRD) are discussed.[3]

Hypotheses

In this study, I examine the relation between the target's equity value prior to the merger announcement and the estimated fair value of the target's R&D subsequently disclosed by the acquirer. As discussed previously, I interpret the association between observed equity values and the estimated fair value of R&D capital as an indication of the extent of alignment between investors' expectations of the payoffs to a firm's R&D activities and the expectations held by privately informed managers.[4] If investors share, at least partially, the expectations held by privately informed managers about the future benefits of a firm's R&D activities, then the target's equity value prior to the merger announcement should be positively associated with the estimated fair value of its R&D capital subsequently disclosed by the acquirer. The foregoing leads to the following hypothesis stated in alternative form:

H1: The target's pre-merger announcement equity value is positively associated with the value of R&D capital subsequently recognized by the acquirer.

As previously discussed, past research has documented that the payoffs to R&D expenditures are associated with significant uncertainty. This uncertainty impedes the ability of privately informed managers and, to a greater degree, external investors to arrive at precise forecasts of the payoffs to R&D investment. Prior research has documented a reluctance by managers to issue guidance related to relatively uncertain outcomes due to the negative consequences of being inaccurate (Cox 1985; Waymire 1985). Hence, the degree to which managers make publicly available their private information about the estimated payoffs to their firms' R&D activities likely declines as the payoffs become more uncertain.

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[3] This study relies on the assumption that the reported R&D fair value estimates pertain to the target on a standalone basis. This assumption would be violated if the R&D fair value estimates also incorporate anticipated synergies. While I am unable to rule out this possibility, the guidance provided the American Institute of Certified Public Accountants for valuing R&D assets acquired in a business combination explicitly calls for the elimination of anticipated synergies from the cash flow forecasts used to value R&D capital.

[4] I do not interpret my tests of the association between equity values and the estimated fair value of R&D capital to be tests of market efficiency. Rather, I assume that markets are efficient with respect to publicly available information and, consequently, that investors completely incorporate all *publicly* available information about a firm's R&D activities into their expectations. Therefore, I interpret the multiple on R&D capital (and its components) in value relevance regressions to be a measure of the degree to which public information about the value of a firm's R&D efforts (as reflected in observed equity values) accords with the private information about the value of a firm's R&D efforts held by management and insiders (as reflected in the subsequently disclosed R&D fair value estimates). My examination of how the multiple on R&D capital varies with financial statement recognition and analyst coverage is designed to shed light on whether these two mechanisms lead to the public revelation of at least some of management's private information about their firms' R&D activities.

As a result, equity values are less likely to incorporate managers' private information about R&D payoffs as the uncertainty surrounding those payoffs increase.

The impact of uncertainty on the market's valuation of R&D can be explicitly examined in this study given that R&D recognized at the time of a business combination is broadly classified as either IPRD or developed technology. IPRD represents the value of early-stage R&D investments that have not yet reached technological feasibility, while developed technology represents the value of R&D investments with demonstrated viability. The risk of innovative activities such as R&D is greatest in the early stages when new discoveries are being made and declines as the innovative process progresses and the focus of activities shifts to refining basic discoveries (Lev 2001). Therefore, developed technology is likely to be associated with relatively less uncertainty than in-process technology because the viability of developed technology has been demonstrated, while the payoffs to IPRD are likely to be relatively more uncertain due to their earlier stage of development and their longer time to payoff. Because the risk of inaccurate forecasts is less for developed technology than for IPRD, managers are likely to provide more public guidance for developed technology than for IPRD. In addition, managers are likely to guard most closely the information related to their early stage projects in order to avoid the premature leakage of sensitive information to competitors. By contrast, companies likely institute less informational barriers for projects that are close to commercial launch or that are already commercially available.

The foregoing suggests that management's private information about the payoff to their firms' R&D activities is more likely to be publicly available for developed technology than for in-process R&D. Hence, equity values likely reflect the estimated value of developed technology to a greater degree than the estimated value of in-process R&D. I, therefore, propose the following hypothesis stated in the alternative form:

> **H2:** The association between the target's pre-merger equity value and developed technology is greater than the association between the target's pre-merger equity value and in-process R&D.

Lev (2002) argues that lack of financial statement recognition of R&D assets limits the informativeness of financial statements about such assets, thereby impeding investors' ability to fully appreciate the value of such assets. Although U.S. accounting standards generally prohibit the recognition of R&D assets, there are circumstances when U.S. firms can recognize R&D assets. Specifically, technology-related intangibles can be recognized by acquirers at the time of an acquisition and companies engaged in software development can capitalize certain development costs pursuant to SFAS No. 86 (FASB 1985).

While recognized amounts are unlikely to be reflective of the fair value of the R&D asset (since fair value adjustments are not allowed after establishing such assets), the mere act of recognition provides a prominent indication to the capital market about the (anticipated) success of a firm's R&D activities. Consistent with this notion, Mohd (2005) documents lower levels of information asymmetry (as proxied by bid-ask spreads and share turnover) for software firms that capitalize rather than expense their R&D costs, which he interprets as evidence that "investors' uncertainty about the future benefits of software development costs is reduced when firms capitalize these costs." My examination of the impact of financial statement recognition differs from Mohd (2005) in that his evidence speaks to whether recognition leads to less diverse beliefs among investors about a firm's R&D activities, while I investigate whether recognition leads to a greater alignment between consensus investor beliefs about the payoffs to a firm's R&D activities (as reflected in equity values) and the presumably more informed beliefs of managers who have superior access to private information about their firm's R&D activities (as reflected in the acquirer's R&D estimates). If even partial financial statement recognition leads to the public revelation of managers' private information about the likely payoffs to their R&D activities, then the positive relation between the target's pre-merger announcement equity value and the estimated fair value of its R&D capital should be greater for targets with at least some R&D assets reflected on their balance sheet prior to the merger announcement. Accordingly, I propose the following hypothesis:

> **H3:** The degree to which a target's preannouncement equity value is associated with the value of R&D capital subsequently recognized by the acquirer is increasing in the amount of R&D-related intangibles recognized on the target's balance sheet prior to the merger announcement.

Barth et al. (2001) provide evidence consistent with analysts attempting to fill the information gap left by unpredictable payoffs to R&D and the lack of transparent financial statement information on R&D payoffs. There are a number of mechanisms by which analysts can influence the market's valuation of R&D. First, analysts' earnings forecasts imbed analyst expectations about the future payoffs to R&D, which are the basis for current valuations of R&D. Second, the information that analysts discover about a firm's R&D activities during the course of preparing earnings forecasts may be explicitly revealed in their analyses and commentary. Barron et al. (2002) document that analysts engage in greater idiosyncratic private information search when forecasting the earnings of R&D-intensive firms and that the forecasts of individual analysts make a greater contribution to the accuracy of the consensus forecast for such firms. This evidence suggests that each analyst potentially uncovers unique pieces of private information about R&D-intensive firms' activities. Therefore, the amount of information produced about a R&D-intensive firm is likely to increase in the number of analysts covering the firm. The foregoing collectively indicates that, if analysts are successful in discovering and imparting private information about a firm's R&D activities, then the degree to which equity values reflect the estimated fair value of R&D capital should be increasing in the number of analysts covering the firm. Hence, I propose the following hypothesis, stated in the alternative form:

> **H4:** The positive association between the target's pre-announcement market capitalization and the estimated value of the target's R&D subsequently recognized by the acquirer is increasing in analyst coverage of the target prior to the merger announcement.

Barth et al. (2001) argue that a key motivation for analysts to follow R&D-intensive firms is to fill the information void created by the lack of transparent financial statement information of R&D assets. The role for analysts in providing useful information to investors is likely to be most pronounced for the portion of the estimated fair value R&D that is unrecognized by the target prior to the merger announcement (i.e., where the information void due to lack of transparent financial statement recognition is greatest). Accordingly, I test the following hypothesis, stated in the alternative form:

H5: The impact of analyst following on the association between the target's pre-merger announcement equity value and the estimated fair value of the target's R&D subsequently disclosed by the acquirer is greater for the portion of the estimated fair value of R&D that was unrecognized by the target prior to the merger announcement than for the portion of the estimated fair value that was recognized by the target on its most recent detailed balance sheet prior to the merger announcement.

III. SAMPLE

The sample selection began with all mergers between publicly traded U.S. companies from the Securities Data Corporation (SDC) database that were completed from July 1, 2001 through December 31, 2004. I required the acquirer to be publicly traded in order to have access to the acquirer's financial statements where the purchase price allocation is disclosed. I required the target to be publicly traded in order to obtain information on the target's market value prior to the merger announcement. I focused on the July 1, 2001–December 31, 2004 time period because of the importance of obtaining fair value estimates that reflect, as accurately and unbiasedly as possible, managers' expectations of the amount, timing, and riskiness of the future payoffs to their R&D activities. Although APB No. 16 (the predecessor to SFAS No. 141) also required companies to assess the fair value of separately identifiable assets, my discussions with valuation professionals who perform appraisals for companies seeking to comply with SFAS No. 141 suggest that these valuations are approached more seriously and with a greater degree of auditor involvement in the post-SFAS No. 141 regime. Prior to the passage of SFAS No. 141, many observers, including former SEC Chairman Arthur Levitt and former SEC Chief Accountant Lynn Turner, believed that firms routinely allocated excessive amounts to in-process R&D (IPRD, which was then immediately expensed) in order to minimize the amounts classified as goodwill that would then be subject to periodic amortization (Dowell and Press 2004). The passage of SFAS No. 141, which became effective in 2001, eliminated the goodwill amortization requirement, thereby removing the primary incentive for firms to inflate the amounts allocated to IPRD.[5] Therefore, I focus on the period beginning July 1, 2001 in order to minimize the possible inclusion of systematically inflated R&D capital estimates in my regression tests.

I consulted the acquirer's 10-K for the fiscal year in which the merger was completed and retained those mergers where the acquirer presented a detailed purchase price allocation related to its acquisition of the target and where the purchase price allocation included non-zero amounts of either IPRD or developed technology. I further require that the target's market capitalization as of 44 trading days prior to the original announcement be available on CRSP. I use the market capitalization 44 trading days prior to the merger announcement in order to obtain an equity value measure that is free from leakage of merger news.[6] This study's examination of the relation between the target's pre-merger announcement equity value and the estimated fair value of the target's assets and liabilities as of the acquisition date relies on an assumed high degree of correlation between the fair values at the time of the original announcement and the fair values as of the merger completion date. To ensure a reasonable alignment between the target's pre-merger announcement equity value and the estimated fair values of the target's assets and liabilities as of the merger announcement date, I further require that time elapsed between the merger announcement and the merger completion date be less than one year.[7] In order to ensure appropriate comparisons between the market value of the target's equity claims and the estimated fair value of the net assets underlying those equity claims, I eliminate those transactions where the target had multiple classes of common stock, some of which were not captured in CRSP, as well as transactions where the acquirer purchased less than 100 percent of the target's equity claims or where the transaction was an asset purchase (as opposed to a stock purchase}. Finally, I eliminate those transactions involving negative goodwill, because SFAS No. 141's requirement that the negative goodwill be allocated to the remaining identifiable assets results in distortions of the reported R&D fair value estimates. These procedures, which are summarized in Table 1, resulted in the identification of 150 mergers where the estimated value of the target's net assets, including its R&D capital, were subsequently recognized and disclosed by the acquirer.

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[5] The motivation to allocate excessive amounts into intangible assets such as developed technology or in-process R&D still remains under SFAS No. 141 to the extent companies wish to avoid allocating amounts to goodwill, which they may view as a "ticking time bomb" subject to inopportune impairment charges.

[6] Schwert (1996) documents a significant run-up in the target's share price in the 42 days prior to the initial merger announcement, which indicates that the market anticipates an initial merger announcement as early as 42 trading days prior to its occurrence. Also, Robinson and Shane (1990) calculate the merger premium as the ratio of the target's share price on the merger announcement date to its share price 40 trading days prior to the merger announcement date. Based on these studies, the target's market capitalization 44 trading days prior to the initial merger announcement is unlikely to reflect leakage of merger news. I also replicate all tests using both the mean and median market capitalization during the period spanning from trading day –40 to trading day –50 relative to the merger announcement date with no change in inferences.

Table 2 provides information on the composition of the sample by industry and by year. The most represented industries are Business Services including computer programming and software, which comprises 40 percent of the sample; Instruments and Related

TABLE 1
Sample Selection Procedures

	Transactions
Total Merger or Acquisition transactions listed on the SDC database involving both U.S. public nonfinancial bidders and U.S. nonfinancial public targets that were completed between July 1, 2001 and December 31, 2004	405
Less: Transactions where a detailed purchase price allocation was not available	(108)
Less: Transactions where no R&D Capital was recognized as part of the purchase price allocation	(113)
Less: Transactions where the target's market capitalization is not available on CRSP	(15)
Less: Transactions where the time elapsed between the initial merger announcement and the completion of the merger exceeds one year	(8)
Less: Transactions where the target had multiple classes of common stock, some of which were not captured on CRSP	(5)
Less: Transactions where less than 100 percent of the target's equity claims were purchased	(1)
Less: Transactions that were asset purchases	(2)
Less: Transactions involving negative goodwill	(3)
Total Number of Target Firms in Sample	150

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[7] The mean (median) calendar days elapsed between the merger announcement date and the merger completion date is 105(89). To the extent that the fair values at the time of merger completion are imperfect proxies for the fair values that existed 44 trading days prior to the merger announcement, the power of the empirical tests is reduced.

TABLE 2
Industry and Acquisition Year Distribution

Panel A: Sample Distribution by Industry

SIC	Industry Name	Total Firms	Percent
20	Food and Kindred Products	2	1.33
25	Furniture and Fixtures	1	0.67
27	Printing, Publishing and Allied Industries	2	1.33
28	Chemical and Allied Products	20	13.33
32	Stone, Clay, Glass, and Concrete Products	1	0.67
33	Primary Metal Industries	1	0.67
34	Fabricated Metal Products, except Machinery and Transportation Equipment	1	0.67
35	Machinery (excluding electric) and Computer Equipment	12	8.00
36	Electrical and Electronic Equipment	16	10.67
38	Instruments and Related Products	24	16.00
39	Miscellaneous Manufacturing	2	1.33
42	Motor Freight Transportation and Warehousing	1	0.67
48	Communications	1	0.67
73	Business Services (including computer programming and software)	60	40.00
87	R&D Services	4	2.66
99	Other	2	1.33
	TOTAL	150	100.00

Panel B: Sample Distribution by Acquisition Year

Acquisition Year	Total Firms	Percent
2001	24	16.00
2002	35	23.33
2003	47	31.33
2004	44	29.34
TOTAL	150	100.00

Products, which comprises 16 percent of the sample; Chemical and Allied Products, which comprises 13 percent of the sample; Electrical and Electronic Equipment, which comprises 11 percent of the sample and Machinery, which comprises 8 percent of the sample. Not surprisingly, these industries correspond to those identified as the most R&D intensive in Lev and Sougiannis (1996). In the ensuing regressions, I include dummy variables corresponding to membership in each of these industries to control for industry fixed effects. The sample is fairly evenly distributed over the sample years. The smaller number of observations for 2001 reflects the inclusion of observations from only the last six months of 2001, corresponding to the effective date of SFAS No. 141.

Table 3 provides descriptive statistics for the sample. The mean (median) pre-merger announcement market capitalization for the sample firms is $940 million ($109 million). Research and development capital is a substantial asset for the sample firms, comprising an average of approximately 18 percent of the total fair value of assets recognized by the acquirer. Developed technology (IPRD) comprises an average of 76 percent (24 percent) of the total estimated value of R&D capital.

TABLE 3
Descriptive Statistics

Variable	n	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
Panel A: Financial Variables						
Dollars (in millions)						
MVE	150	940.188	4,811.003	40.412	109.438	400.534
NETASSETS	150	766.002	2,689.231	54.921	142.654	482.769
RDCAPITAL	150	416.347	3,042.252	6.918	23.086	75.388
DEVELOPED	150	312.844	2,588.749	4.200	12.775	37.000
INPROCESS	150	103.503	500.263	0.000	1.900	17.300
RDRECOGNIZED	139	7.865	39.321	0.000	0.104	3.959
RDUNRECOGNIZED	139	421.684	3,119.704	4.612	18.029	63.677
Scaled by *MVE*						
NETASSETS/MVE	150	1.486	1.047	0.940	1.336	1.738
RDCAPITAL/MVE	150	0.374	0.483	0.086	0.196	0.432
DEVELOPED/MVE	150	0.233	0.330	0.061	0.137	0.265
INPROCESS/MVE	150	0.141	0.367	0.000	0.018	0.102
RDRECOGNIZED/MVE	139	0.044	0.128	0.000	0.001	0.027
RDUNRECOGNIZED/MVE	139	0.333	0.489	0.069	0.170	0.383
Percentage						
RDCAPITAL%	150	17.6	19.9	4.8	10.4	20.6
DEVELOPED%	150	75.5	31.6	61.4	89.0	100.0
INPROCESS%	150	24.5	31.6	0.0	11.0	38.6
RDRECOGNIZED%	139	20.6	53.9	0.0	0.4	19.2
RDUNRECOGNIZED%	139	79.4	53.9	80.8	99.6	100.0
Panel B: Analyst Variables						
COVERAGE	150	7.000	8.918	2.000	4.000	8.000
AVEEFFORT	129	16.187	7.366	12.00	15.00	18.158

Panel C: Financial Statement Recognition

Classification Variable	Number of Firms	[%]
R&D Asset Formally Recognized by Target Prior to Acquisition	83	[55.3]
No R&D Asset Formally Recognized by Target Prior to Acquisition	67	[44.7]
Total	150	[100.0]

Panel D: Transaction Characteristics

Variable	n	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
PREMIUM	150	1.821	1.026	1.257	1.618	2.052
CAR (%)	150	−3.011	10.012	−8.891	−1.854	2.204
MVEACQ (millions)	150	14,934.762	39,256.551	332.997	1,350.700	7,505.356
BVEACQ (millions)	150	3,486.046	8,362.204	192.879	678.075	2,444.599
DEALRATIO (%)	150	32.5	40.0	5.4	18.6	45.1
PCTCASH (%)	150	44.7	45.0	0.0	24.7	100.0
PCTSTOCK (%)	150	55.3	45.0	0.0	75.3	100.0

(*continued on next page*)

TABLE 3 (continued)

MVE = target's market capitalization as of 44 trading days prior to the merger announcement date;
NETASSETS = acquirer's estimate of the fair value of the target's net assets and goodwill at the time of acquisition, excluding the acquirer's estimate of the fair value of the target's R&D capital;
RDCAPITAL = sum of acquirer's estimates of the fair value of the target's in-process R&D and developed technology;
DEVELOPED = acquirer's estimate of the fair value of the target's developed technology;
INPROCESS = acquirer's estimate of the fair value of the target's in-process R&D;
RDRECOGNIZED = net book value of research and development assets recognized by the target on the last detailed balance sheet available as of 44 trading days prior to the merger announcement date;
RDUNRECOGNIZED = *RDCAPITAL* − *RDRECOGNIZED;*
RDCAPITAL% = *RDCAPITAL* divided by the total fair value of assets recognized by the acquirer;
INPROCESS% = *INPROCESS* divided by *RDCAPITAL;*
DEVELOPED% = *DEVELOPED* divided by *RDCAPITAL;*
RDRECOGNIZED% = *RDRECOGNIZED* divided by *RDCAPITAL;*
RDUNRECOGNIZED% = *RDUNRECOGNIZED* divided by *RDCAPITAL;*
COVERAGE = number of analysts making a forecast for the target firm during the 365 days ending 44 trading days prior to the merger announcement, and 0 for firms with no coverage listed on I/B/E/S;
logCOVERAGE = log(1+ *COVERAGE*);
AVEEFFORT = average number of firms followed by all analysts issuing forecasts for the target firm during the 365 days ending 44 trading days prior to the merger announcement;
PREMIUM = ratio of the purchase price of the merger to the market capitalization of the target 44 trading days prior to the merger announcement;
CAR = cumulative market-adjusted return over the period spanning from day 0 to day 1 where day 0 is the merger announcement date and where the market index is the CRSP value-weighted index;
MVEACQ = market capitalization of the acquirer as of 5 days following the release of the first quarterly financial statements after consummation of the merger;
BVEACQ = acquirer's book value of equity as reported in the first quarterly financial statements following consummation of the merger minus the amount allocated by the acquirer to developed technology;
DEALRATIO = ratio of the purchase price to the acquirer's market value as of 44 trading days prior to the merger announcement date;
PCTCASH = value of cash consideration divided by total consideration; and
PCTSTOCK = value of stock consideration divided by total consideration.

The mean of *RDCAPITAL* differs slightly from the sum of the means of *RDUNRECOGNIZED* and *RDRECOGNIZED* due to the reduced sample of firms for which *RDUNRECOGNIZED* and *RDRECOGNIZED* could be calculated. The mean of *PREMIUM* differs slightly from the sum of the means of *NETASSETS/MVE* and *RDCAPITAL/MVE* because *NETASSETS* excludes restructuring charges taken by the acquirer at the time of the transaction as such charges clearly do not relate to the target's value on a stand-alone basis.

Panel B of Table 3 provides statistics on the analyst coverage for the sample firms. The mean (median) analyst following for the sample firms is 7 (4). In regression tests used in this study, I use the log transformation of the analyst following measures in order to minimize the effects of skewness in analyst coverage, consistent with Bowen et al. (2005). The mean (median) average number of firms followed by the analysts who cover the 129 sample firms with positive analyst following is approximately 16 (15).

Panel C of Table 3 summarizes the proportion of firms that had some amount of R&D assets recognized on their last quarterly balance sheet prior to the merger announcement. About 55 percent of the sample had some R&D asset recognized on their balance sheet prior to the merger announcement, indicating that even though U.S. accounting rules suppress the widespread recognition of R&D assets, the limited occasions for which firms can recognize such assets provides sufficient variation to examine the impact of even partial recognition on the market's ability to incorporate the fair value of R&D capital into share prices. As shown in Panel A of Table 3, however, the amounts recognized are typically small in relation to the estimated fair value of R&D capital. Specifically, mean (median) ratio of R&D assets recognized by the target to the fair value of R&D capital recognized by the acquirer is approximately 21 percent (0.4 percent).

Panel D of Table 3 provides some descriptive statistics on the transaction characteristics. Not surprisingly, the mean (median) market capitalization for the acquirers of $14.9 billion ($1.4 billion) is substantially larger than the mean (median) market capitalization for the targets of $940 million ($109 million). The mean (median) book value of the acquirer's net assets of $3.5 billion ($678 million) is substantially smaller than the corresponding market capitalization, reflecting the historical cost convention that characterizes U.S. accounting standards, which generally prevents firms from writing assets up to fair value. The mean (median) purchase price as a percentage of the acquirer's pre-merger announcement capitalization is approximately 32 percent (19 percent), indicating that the sample transactions are generally economically significant to the acquirer. The transactions involve substantial premiums, with a mean (median) premium of 82 percent (62 percent).[8] Investor reaction surrounding the initial announcement of the sample transactions was generally unfavorable, with mean (median) market-adjusted announcement period returns of −3.0 percent (−1.9 percent). The mean (median) percentage of consideration in the form of stock is 55 percent (75 percent) and two-thirds of the sample transactions involve the use of stock as consideration. The negative average market is likely linked to the extensive use of stock as a form of consideration in the sample transactions.[9]

IV. RESEARCH DESIGN AND EMPIRICAL RESULTS

Regression Tests of the Market's Valuation of R&D Capital

As depicted in Figure 1, the regression tests reported in this paper relate the target's market capitalization as of 44 trading days prior to the original merger announcement to the acquirer's estimate of the fair value of the target's net assets, including R&D capital, as of the effective date of the merger. Consistent with prior value relevance studies, the

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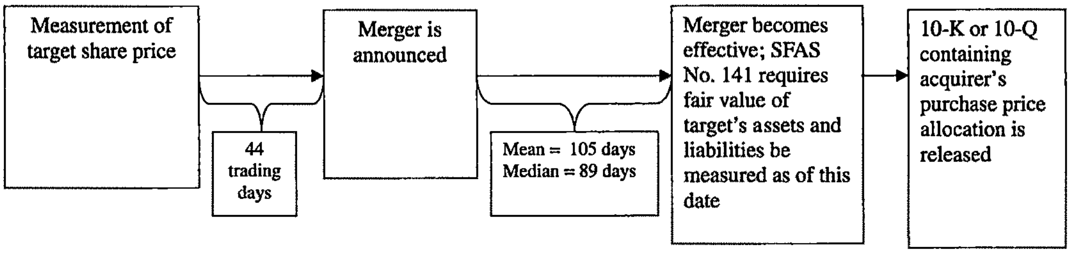
[8] To determine the reasonableness of the premiums I report, I consulted the Mergerstat Annual Review for 2005, which contains useful historical statistics on U.S. mergers, including acquisition premiums. This review revealed that the sample period included years where acquisition premia were at historical highs. Specifically, the average merger premiums reported by Mergerstat for 2001, 2002, and 2003 of 57.2 percent, 59.7 percent, and 62.3 percent, respectively, were the highest of the 25-year period spanning 1981 through 2005. In addition, review of the Mergerstat statistics revealed that during much of this period, acquisition premia were above average for computer software firms, which constitute the single largest category of my sample. Specifically, according to Mergerstat, the average premia for firms in the "Computer Software, Supplies & Services" industry sector during 2000, 2001, and 2002 were 74.8 percent, 71.5 percent, and 52.7 percent, respectively. Because the premia reported by Mergerstat relate the consideration offered to the target's market capitalization five days prior to the merger announcement, they are likely understated relative to the premia I report given the evidence provided by Schwert (1996) that merger news begins to be incorporated into share prices as early as 42 trading days prior to a merger announcement. To obtain an apples-to-apples comparison between the premia I calculate and those reported by Mergerstat, I recalculated the acquisition premia for my sample using the target's market capitalization as of five trading days prior to the merger announcement. The resulting mean (median) premium under this method for my sample firms is 64 percent (47 percent). These amounts are reasonably close the premia reported by Mergerstat over the same period, particularly given the heavy weighting of software firms in my sample. To some extent, the premiums I report may be high as a result of the fact that the consideration used in my sample includes transactions costs. However, given the reasonable alignment between the premiums I report and those reported by Mergerstat when calculated on a common basis, this does not appear to be a significant factor.

[9] Travlos (1987) finds that the market response to cash-based mergers is insignificant, consistent with the notion that investors interpret the announcement of a stock swap as a signal that managers of the acquiring firm have adverse private information (Myers and Majluf 1984).

FIGURE 1
Timeline of Relevant Dates


Measurement of target share price
44 trading days
Merger is announced
Mean = 105 days
Median = 89 days
Merger becomes effective; SFAS No. 141 requires fair value of target's assets and liabilities be measured as of this date
10-K or 10-Q containing acquirer's purchase price allocation is released

ensuing regressions are based on a valuation model where a firm's market value is equal to its assets minus its liabilities. The basic model upon which the subsequent regression models used in this study build is as follows (firm subscripts in this and all ensuing regression models are assumed):

$$MVE = a_0 + a_1 NETASSETS + a_2 RDCAPITAL + \text{yearly fixed effects} + \text{industry fixed effects} + e \tag{1}$$

where:

MVE = target's market capitalization as of 44 trading days prior to the original merger announcement date;
NETASSETS = acquirer's estimate of the fair value of the target's identifiable net assets and goodwill at the time of acquisition, excluding the acquirer's estimate of the fair value of the target's R&D capital; and
RDCAPITAL = sum of acquirer's estimates of the fair value of the target's in-process R&D and developed technology.[10]

I control for yearly fixed effects by including dummy variables corresponding to all sample years. I control for industry fixed effects by including dummy variables corresponding to the following two-digit SIC codes: 28, 35, 36, 38, and 73.

To address the problems of heteroscedasticity and the undue influence of the largest firms on the coefficient estimates, I follow Easton and Sommers (2003) by estimating Equation (1) and all ensuing regression models using weighted least squares, where each observation is weighted by the square of market capitalization. In addition, to mitigate the impact of outliers, I report estimates based on Huber M estimation, which is a robust estimation method that, instead of minimizing the sum of squared residuals, minimizes the sum of less rapidly increasing functions of the regression residuals (Huber 1973; Chen 2002).[11]

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[10] In addition to the target's identifiable net assets, I include the goodwill recognized by the acquirer as part of *NETASSETS* in order to control for sources of value for the target that are not eligible for separate identification under SFAS No. 141 but that are likely to be reflected in observed equity values (for example, assembled work force).

[11] All inferences are qualitatively unchanged if I estimate regressions using ordinary least squares after deleting observations with a Cook's D greater than one or absolute value of studentized residuals greater than three.

The results of estimating Equation (1) are presented in Table 4. As expected, the coefficient on *NETASSETS* of 0.568 is significant at $p = 0.000$. Turning to the primary variable of interest, the coefficient on *RDCAPITAL* of 0.526 is significant at $p = 0.000$. This result confirms prior findings in support of the value relevance of R&D, using more precise estimates of R&D values.

If investors' ability to incorporate the value of R&D capital is a function of the degree of information availability about a firm's R&D activities, then the target's equity values should reflect the value of the relatively more speculative in-process R&D, for which public information is likely to be sparse, to a lesser extent than the value of developed technology, for which public information is likely to be more available. To test this hypothesis (H2), I estimate the following regression, which modifies Equation (1) by decomposing *RDCAPITAL* into developed (*DEVELOPED*) and in-process (*INPROCESS*) technology (firm subscripts are assumed):

$$\begin{aligned} MVE = {} & a_0 + a_1 NETASSETS + a_{2a} DEVELOPED + a_{2b} INPROCESS \\ & + \text{yearly fixed effects} + \text{industry fixed effects} + e \end{aligned} \tag{2}$$

where *DEVELOPED* is the acquirer's estimate of the fair value of the target's developed technology and *INPROCESS* is the acquirer's estimate of the fair value of the target's in-process R&D. All other variables are as defined previously.

Table 4 presents the results of estimating Equation (2). While both *DEVELOPED* and *INPROCESS* are positively associated with *MVE*, the coefficient on *DEVELOPED* of 0.862 is significantly larger than the coefficient on *INPROCESS* of 0.442 at $p = 0.000$. This result

TABLE 4
Baseline Tests of the Value-Relevance of Research and Development Capital

Dependent Variable: *MVE*			**Model 1[a] (n = 150)**		**Model 2[b] (n = 150)**	
Row	**Variable**	**Predicted Sign**	**Coefficient Estimate**	**p-value**	**Coefficient Estimate**	**p-value**
1	Intercept	?	2.260	0.769	15.222	0.040
2	*NETASSETS*	+	0.568	0.000	0.536	0.000
3	*RDCAPITAL*	+	0.526	0.000	—	—
4	*DEVELOPED*	+	—	—	0.862	0.000
5	*INPROCESS*	+	—	—	0.442	0.000
6	Yearly fixed effects	?	suppressed	suppressed	suppressed	suppressed
7	Industry fixed effects	?	suppressed	suppressed	suppressed	suppressed
Test of Row 4 − Row 5 (i.e., H2)		+	—	—	0.420	0.000
	Adjusted R^2		84.1%		84.4%	

[a] Model 1: $MVE = a_0 + a_1 NETASSETS + a_2 RDCAPITAL$ + yearly fixed effects + industry fixed effects + e.

[b] Model 2: $MVE = a_0 + a_1 NETASSETS + a_{2a} DEVELOPED + a_{2b} INPROCESS$ + yearly fixed effects + industry fixed effects + e.

Following Easton and Sommers (2003), each observation is weighted by the square of market capitalization. Results from Huber M estimation are reported. The p-values are one-tailed when a sign expectation is provided. See Table 3 for variable definitions.

indicates that the market's expectations about the future payoffs to R&D are in greater alignment with privately informed managers' expectations for the portion of R&D related to developed technology than for the portion related to in-process technology, thereby supporting H2.[12]

A potential alternative explanation for the lower multiple on *INPROCESS* relative to *DEVELOPED* is that it is the result of differences in the properties of the fair value estimates for the two components of R&D capital.[13] Specifically, it is possible that the amounts assigned to in-process technology are systematically inflated relative to those assigned to developed technology. This would be the case if acquirers systematically overestimate the benefits of a target's in-process technology or if, in those cases where an acquirer has overpaid for an acquisition, the overpayment is assigned to in-process technology. To the extent the amounts assigned to in-process technology are inflated, the coefficient on *INPROCESS* will be reduced.

To explore this possibility, I augment Equation (2) by interacting each of the variables with two alternative proxies for the extent to which the market detects overpayment at the time a business combination is announced. While this additional analysis is not conclusive, if the lower multiple on *INPROCESS* in Equation (2) is the result of overpayment, then it should become less pronounced when a control for the market's assessment of likely overpayment is incorporated into the regression. The first proxy for the market's assessment of overpayment is the abnormal return of the acquirer for the period spanning two trading days before to one trading day after the transaction announcement date. The second proxy is *WEALTH*, which is a dummy variable equal to 1 when the market's assessment of the wealth created by the merger is positive, and 0 otherwise. I measure market's assessment of wealth creation as the sum of the target's announcement period abnormal return times its market capitalization 44 trading days prior to the merger announcement plus the acquirer's announcement period abnormal return multiplied by its market capitalization 44 trading days prior to the merger announcement. In untabulated regressions, I find that use of either proxy does not alter the results reported in Table 4.

Regression Tests of the Joint Impacts of Financial Statement Recognition and Analyst Following on the Market's Valuation of R&D Capital

I perform the following regression in order to test the influences of both financial statement recognition and analyst coverage on the association between equity value and the estimated fair value of R&D capital:

$$\begin{aligned} MVE = {} & c_0 + c_1 NETASSETS + c_2 RDCAPITAL + c_3 RDCAPITAL \\ & \times logCOVERAGE + c_4 RDCAPITAL \times RECOGNIZED \\ & + c_5 logCOVERAGE + c_6 RECOGNIZED \\ & + \text{yearly fixed effects} + \text{industry fixed effects} + e \end{aligned} \tag{3}$$

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[12] The coefficient on *DEVELOPED* of 0.862 is weakly significantly less than 1 at $p = 0.118$ (two-tailed), consistent with either a less than perfect alignment between investors' expectation of the payoffs to developed technology and the expectations held by privately informed managers or less than perfect alignment between the fair value of R&D as of 44 trading days prior to the initial transaction announcement and the fair value of R&D as of the transaction completion date.

[13] I thank an anonymous reviewer for this insight.

where:

RECOGNIZED = 1 if the target formally recognized any amount of R&D assets on the last detailed balance sheet it issued prior to the merger announcement, and 0 otherwise;[14]

logCOVERAGE = log(1+*COVERAGE*); and

COVERAGE = the number of analysts making a forecast for the target firm during the 365 days ending 44 trading days prior to the merger announcement, and 0 for firms with no coverage listed on I/B/E/S.

All other variables are as defined previously.

In examining the pre-merger announcement balance sheets of the targets, there are 11 firms for which the footnotes indicate that the recognized intangible assets of the target include some amount of R&D, but provide insufficient detail on the net book value of the R&D asset. In most of these cases, the gross amount of each asset comprising recognized intangible assets is listed individually, but the accumulated amortization attributable to these assets is listed only in aggregate. Therefore, I define *RECOGNIZED* as binary classification variable for tests that make use of the entire sample. This measure of financial statement recognition provides insight on the effect of the act of recognition on the association between equity value and the estimated fair value of R&D capital, without regard to how closely the recognized amounts approximate fair value. In subsequent tests, I provide insight on whether the effect of financial statement recognition is related to how closely the recognized amounts approximate fair value by examining the market's differential valuation of the recognized and unrecognized portions of R&D capital for those observations where the net book value of R&D assets recognized by the acquirer prior to the merger announcement could be determined.

Panel A of Table 5 presents the results of estimating Equation (3). Consistent with the results presented in Table 4, the coefficient on *RDCAPITAL* of 0.290 is significantly positive at $p = 0.006$ but is also significantly less than 1.0, indicating that investor expectations about the amount, timing, and riskiness of R&D payoffs are imperfectly correlated with the expectations held by privately informed managers. The coefficient on the interaction of *RDCAPITAL* and *RECOGNIZED* of 0.194 is significantly positive at $p = 0.037$, which indicates that even partial recognition is associated with a greater alignment in the expectations of payoffs to R&D held by investors and those held by privately informed managers, consistent with H3. The coefficient on the interaction between *RDCAPITAL* and *logCOVERAGE* of 0.105 is significant at $p = 0.040$. This finding indicates that the degree to which market prices incorporate the value of R&D capital is increasing in the degree of analyst following and provides support for H4.

I investigate the impact of financial statement recognition and analyst coverage on the market's valuation of the individual components of *RDCAPITAL* by estimating the following regression:

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[14] In those cases where the target's most recent SEC filing as of 44 trading days preceding the merger announcement was a 10-Q where the balance sheet and footnotes were not detailed, I consulted the target's most recent 10-K as of 44 trading days preceding the merger announcement to determine whether the target's pre-merger announcement balance sheet included R&D intangibles.

TABLE 5
Joint Tests of the Incremental Effects of Analyst Coverage and Financial Statement Recognition on the Value Relevance of Research and Development Capital

Variable	Predicted Sign	Coefficient Estimate	p-value
Panel A: Model 3[a] (n = 150)			
Dependent Variable: *MVE*			
Intercept	?	6.761	0.481
NETASSETS	+	0.556	0.000
RDCAPITAL	+	0.290	0.006
RDCAPITAL × *logCOVERAGE*	+	0.105	0.040
RDCAPITAL × *RECOGNIZED*	+	0.194	0.037
logCOVERAGE	?	−0.058	0.962
RECOGNIZED	?	4.225	0.016
Yearly fixed effects	?	suppressed	suppressed
Industry fixed effects	?	suppressed	suppressed
Adjusted R^2		85.1%	
Panel B: Model 4[b] (n = 150)			
Dependent Variable: *MVE*			
Intercept	?	8.325	0.333
NETASSETS	+	0.540	0.000
DEVELOPED	+	0.280	0.029
INPROCESS	+	0.349	0.053
DEVELOPED × *logCOVERAGE*	+	0.199	0.013
INPROCESS × *logCOVERAGE*	+	0.038	0.371
DEVELOPED × *RECOGNIZED*	+	0.376	0.020
INPROCESS × *RECOGNIZED*	+	0.049	0.383
logCOVERAGE	?	−0.229	0.854
RECOGNIZED	?	3.460	0.057
Yearly fixed effects	?	suppressed	suppressed
Industry fixed effects	?	suppressed	suppressed
Adjusted R2		85.3%	

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[a] Model 3: $MVE = c_0 + c_1 NETASSETS + c_2 RDCAPITAL + c_3 RDCAPITAL \times logCOVERAGE + c_4 RDCAPITAL \times RECOGNIZED + c_5 logCOVERAGE + c_6 RECOGNIZED$ + yearly fixed effects + industry fixed effects + e.

[b] Model 4: $MVE = c_0 + c_1 NETASSETS + c_{2a} DEVELOPED + c_{2b} INPROCESS + c_{3a} DEVELOPED \times logCOVERAGE + c_{3b} INPROCESS \times logCOVERAGE + c_{4a} DEVELOPED \times RECOGNIZED + c_{4b} INPROCESS \times RECOGNIZED + c_5 logCOVERAGE + c_6 RECOGNIZED$ + yearly fixed effects + industry fixed effects + e.

Following Easton and Sommers (2003), each observation is weighted by the square of market capitalization. Results from Huber M estimation are reported. The p-values are one-tailed when a sign expectation is provided. See Table 3 for variable definitions.

$$\begin{aligned} MVE = {} & c_0 + c_1 NETASSETS + c_{2a} DEVELOPED + c_{2b} INPROCESS \\ & + c_{3a} DEVELOPED \times logCOVERAGE + c_{3b} INPROCESS \\ & \times logCOVERAGE + c_{4a} DEVELOPED \times RECOGNIZED \\ & + c_{4b} INPROCESS \times RECOGNIZED + c_5 logCOVERAGE \\ & + c_6 RECOGNIZED + \text{yearly fixed effects} \\ & + \text{industry fixed effects} + e. \end{aligned} \tag{4}$$

Panel B of Table 5 presents the results of estimating Equation (4). The coefficients on developed technology and in-process R&D of 0.280 and 0.349, respectively, are both significant at $p < 0.06$ and are also both less than 1.0. This evidence indicates that, in the absence of analyst coverage or financial statement recognition, equity values only partially incorporate the expectations held by privately informed managers as reflected in the fair value estimates.[15] The coefficient on the interaction between *DEVELOPED* and *logCOVERAGE* of 0.199 is significant at $p = 0.013$, while the coefficient on the interaction between *INPROCESS* and *logCOVERAGE* of 0.038 is insignificant. These results provide evidence in support of analysts' role in uncovering and revealing managers' private information related to developed technology but not the earlier stage in-process technology. A potential reason for the lack of evidence that analysts uncover private information related to in-process technology is the fact that companies are likely to guard most closely information related to their early stage projects in order to avoid the premature leakage of sensitive information to competitors. By contrast, analysts likely have an easier task of uncovering private information related to the value of developed technology to the extent companies likely institute less informational barriers for projects that are close to commercial launch or that are already commercially available.

The coefficient on the interaction of *DEVELOPED* and *RECOGNIZED* of 0.376 is significant at $p = 0.020$, while the coefficient on the interaction of *INPROCESS* and *RECOGNIZED* of 0.049 is insignificant. This result provides support for the idea that financial statement recognition aids the market's incorporation of the value of developed technology, but provides no support for the idea that financial statement recognition plays a role in the market's incorporation of the value of early stage R&D efforts. Given that recognized amounts pertain only to projects that have reached technological feasibility, it is not surprising that the regression results fail to provide evidence that financial statement recognition is informative about the value of in-process R&D. Overall, the evidence presented in Table 5 is consistent with the notion that firms that are able to formally recognize at least a portion of their R&D assets (because they acquired these assets externally or because they have capitalizable software development costs) benefit from higher stock market valuations of their developed technology.

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[15] The fact that investors partially incorporate the value of both developed technology and in-process R&D in the absence of analyst coverage or financial statement recognition is likely due to the fact that, although the value of R&D is largely firm-specific (and, therefore, dependent on private information), there is also a component to the value of R&D that is common across firms in an industry (Lev and Sougiannis 1996). Because this comment element of the value of R&D capital is publicly available, investors would be expected to incorporate it into their equity valuations even in the absence of financial statement recognition or private information search activities of analysts. Consistent with this view, Lev and Sougiannis (1996) find that equity values incorporate measures of R&D capital that they construct based solely on industry-wide amortization rates.

Taken collectively, the results reported in Panels A and B of Table 5 confirm the separate and unique roles of both financial statement recognition and analyst activities in enhancing investors' appreciation for the value of firms' developed technology.

Regression Tests of the Market's Valuation of the Recognized and Unrecognized Portions of R&D Capital and of the Differential Impact of Analyst Following on the Market's Valuation of the Recognized and Unrecognized Portions of R&D Capital

The previously reported results with respect to financial statement recognition provide evidence that the *act* of recognition is associated with a greater association between equity values and the estimated fair value of R&D capital. In this section, I investigate the impact of the *magnitude* of financial statement recognition by examining whether the market capitalizes the recognized portion of R&D capital differently from the unrecognized portion for the 139 observations for which the net book value of R&D assets recognized by the acquirer prior to the merger announcement could be determined. Specifically, I estimate the following regression:

$$\begin{aligned} MVE = {} & d_0 + d_1 NETASSETS + d_2 RDRECOGNIZED \\ & + d_3 RDUNRECOGNIZED + \text{yearly fixed effects} \\ & + \text{industry fixed effects} + e \end{aligned} \tag{5}$$

where *RDRECOGNIZED* is the net book value of research and development assets recognized by the target on the last detailed balance sheet available as of 44 days prior to the merger announcement date, and *RDUNRECOGNIZED* is *RDCAPITAL* − *RDRECOGNIZED*. All other variables are as defined previously.

The results of estimating Equation (5) are presented in Panel A of Table 6. The coefficients on *RDRECOGNIZED* and *RDUNRECOGNIZED* of 0.990 and 0.512, respectively, are positive at $p = 0.000$. Consistent with H3, the coefficient on *RDRECOGNIZED* is significantly greater than the coefficient on *RDUNRECOGNIZED* by 0.478 ($p = 0.038$), indicating that the market places greater weight on the recognized portion of R&D capital.

In connection with this analysis, I also examine whether there is a differential impact of analyst coverage for the recognized versus unrecognized portions of R&D capital. This analysis is motivated by Barth et al.'s (2001) argument that a key motivation for analysts to follow R&D-intensive firms is to fill the information void created by the lack of transparent financial statement information of R&D assets. Based on this argument, H5 hypothesizes that analysts will be most impactful in enhancing investors' appreciation for the portion of the estimated fair value of R&D capital that was unrecognized on the target's balance sheet prior to the merger announcement. To test this hypothesis, I estimate the following regression:

$$\begin{aligned} MVE = {} & d_0 + d_1 NETASSETS + d_2 RDRECOGNIZED \\ & + d_3 RDUNRECOGNIZED + d_4 RDRECOGNIZED \\ & \times logCOVERAGE + d_5 RDUNRECOGNIZED \\ & \times logCOVERAGE + d_6 logCOVERAGE + \text{yearly fixed effects} \\ & + \text{industry fixed effects} + e. \end{aligned} \tag{6}$$

TABLE 6
Test of the Market's Differential Valuation of Recognized and Unrecognized Components of R&D Capital and of the Differential Effect of Analyst Coverage on the Market's Valuation of Recognized and Unrecognized Components of R&D Capital

Dependent Variable: *MVE*			**Model 5[a]**		**Model 6[b]**	
Row	**Variable**	**Predicted Sign**	**Coefficient Estimate**	**p-value**	**Coefficient Estimate**	**p-value**
Panel A: Full Sample (n = 139)						
1	Intercept	?	3.465	0.649	9.192	0.269
2	*NETASSETS*	+	0.565	0.000	0.562	0.000
3	*RDRECOGNIZED*	+	0.990	0.000	1.329	0.000
4	*RDUNRECOGNIZED*	+	0.512	0.000	0.318	0.000
5	*RDRECOGNIZED* × *logCOVERAGE*	+	—	—	−0.298	0.698
6	*RDUNRECOGNIZED* × *logCOVERAGE*	+	—	—	0.115	0.031
7	*logCOVERAGE*	?	—	—	−0.367	0.781
	Yearly fixed effects	?	suppressed	suppressed	suppressed	suppressed
	Industry fixed effects	?	suppressed	suppressed	suppressed	suppressed
	Test of Row 3 – Row 4 (i.e., H3)	?	0.478	0.038	1.011	0.000
	Adjusted R^2	?	84.6%		84.9%	
Panel B: Excluding Capitalized Software Observations (n = 118)						
1	Intercept	?	4.116	0.603	14.971	0.090
2	*NETASSETS*	+	0.570	0.000	0.552	0.000
3	*RDRECOGNIZED*	+	0.900	0.003	0.921	0.002
4	*RDUNRECOGNIZED*	+	0.488	0.000	0.200	0.001
5	*RDRECOGNIZED* × *logCOVERAGE*	+	—	—	−0.013	0.505
6	*RDUNRECOGNIZED* × *logCOVERAGE*	+	—	—	0.167	0.007
7	*logCOVERAGE*	?	—	—	0.303	0.833
	Yearly fixed effects	?	suppressed	suppressed	suppressed	suppressed
	Industry fixed effects	?	suppressed	suppressed	suppressed	suppressed
	Test of Row 3 – Row 4 (i.e., H3)	?	0.412	0.108	0.721	0.012
	Adjusted R^2	?	85.4%		86.0%	

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[a] Model 5: $MVE = d_0 + d_1 NETASSETS + d_2 RDRECOGNIZED + d_3 RDUNRECOGNIZED$ + yearly fixed effects + industry fixed effects + e.

[b] Model 6: $MVE = d_0 + d_1 NETASSETS + d_2 RDRECOGNIZED + d_3 RDUNRECOGNIZED + d_4 RDRECOGNIZED \times logCOVERAGE + d_5 RDUNRECOGNIZED \times logCOVERAGE + d_6 logCOVERAGE$ + yearly fixed effects + industry fixed effects + e.

Following Easton and Sommers (2003), each observation is weighted by the square of market capitalization. Results from Huber M estimation are reported. The p-values are one-tailed when a sign expectation is provided. See Table 3 for variable definitions.

The results of estimating Equation (6) are presented in Panel A of Table 6. Consistent with the results of estimating Equation (5), the coefficients on *RDRECOGNIZED* and *RDUNRECOGNIZED* of 1.329 and 0.318, respectively, are positive at $p = 0.000$. The difference between the coefficient on *RDRECOGNIZED* and the coefficient on *RDUNRECOGNIZED* of 1.011 is significant at $p = 0.000$. The coefficient on the interaction of *RDRECOGNIZED* and *logCOVERAGE* of -0.298 is insignificant, providing no support for the idea that analysts play a role in the market's valuation of recognized R&D amounts. By contrast and consistent with H5, the coefficient on the interaction of *RDUNRECOGNIZED* and *logCOVERAGE* of 0.115 is significant at $p = 0.031$. Thus, evidence of analysts' influence on the market's valuation of R&D capital is limited to the portion of R&D capital that was unrecognized by the target prior to the merger announcement.

As discussed previously, financial statement recognition of R&D assets can arise either through a business combination or through the capitalization of software development costs pursuant to SFAS No. 86. It is possible that the source of R&D asset recognition impacts the informativeness of the recognized amounts. Specifically, amounts capitalized periodically pursuant to SFAS No. 86 may be more informative about the success of a firm's ongoing R&D activities than amounts capitalized only intermittently at the time of an acquisition.[16] To determine whether the market's greater valuation of recognized amounts is driven by capitalized software amounts, I repeat the estimations of Equations (5) and (6) after excluding the 21 observations for which the recognized R&D amounts included capitalized software amounts. The results of this analysis are presented in Panel B of Table 6. The tenor of the results is unchanged from those reported in Panel A of Table 6, indicating that investors find amounts capitalized at the time of business acquisitions to be informative.

The results reported in Table 6 indicate that equity values reflect recognized R&D amounts to a greater degree than unrecognized R&D amounts. Moreover, the role analysts play in uncovering and conveying to investors private information about the value of R&D is strongest for the unrecognized portion of R&D capital.

Caveats

The results in this section are subject to a number of caveats. First, it is possible that the effect of recognition I document may be driven by the events giving rise to recognition and not by recognition itself. In the case of amounts capitalized as a result of a prior business combination, for example, it could be the case that the news of the transaction itself was informative about the value of R&D acquired not the recognition of the R&D asset on the balance sheet.

A second caveat is that my assumption that the reported fair value estimates are unbiased reflections of the acquirer's assessment of the fair value of the target's R&D capital may not hold. Later in this paper, I report the results of tests designed to explore this possibility.

A third caveat is that my assumption that managers (whose expectations are reflected in the R&D fair value estimates) are better informed than the market about the value of their firms' R&D capital may not strictly hold. Dye and Sridhar (2002) derive an analytical model in which capital market participants are collectively better informed than management. If the information held by the market but not by management dominates the superior access to private information presumably held by managers, then it is possible that my tests can be alternatively interpreted as documenting the extent to which the acquirer relies on the superior information contained in the target's pre-merger announcement merger capitalization when preparing the R&D fair value estimate. In assessing the potential impact of this possibility on my study, I appeal to the collective weight of past empirical research, which is consistent with managers having a significant informational advantage about their R&D relative to the market.[17] I am unaware of countervailing empirical research that indicates that the information about a firm's R&D held by the market but not yet incorporated by managers is economically more significant than the private information to which managers have superior access.

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[16] I thank an anonymous reviewer for this insight.

A fourth caveat, which is closely related to the third caveat, is that an alternative interpretation of the effects of both analyst following and recognition that I document is that they simply reflect acquirers' greater reliance on pre-merger announcement market capitalization in estimating the fair value of R&D when targets have recognized R&D assets or substantial analyst following prior to the transaction. An important factor in assessing how serious a concern this possibility is for my study is the fact that, in connection with the passage of SFAS No. 141, the American Institute of Certified Public Accountants issued guidance on the appropriate techniques for valuing R&D-related intangibles acquired in a business combination (AICPA 2001). As described in the Appendix, the AICPA recommends that managers prepare independent cash flow projections of the payoffs to R&D as the primary input into their fair value estimates. The extensive list of information items that the AICPA recommends acquirers rely on when preparing such projections does not include the target's prior stock price or market capitalization. The AICPA's emphasis on information sources not directly linked to the target's pre-merger announcement market capitalization decreases, though it does not eliminate, the possibility that my tests reflect the extent to which acquirers use the target's pre-merger announcement to value the R&D asset. However, the AICPA's guidance does not preclude the use of the target's pre-announcement market price as an input into valuing the R&D asset and the target's prior stock price may provide useful information for estimating the fair value of R&D capital. Given that the underlying valuations are not available for my sample firms, I am unable to rule out this alternative interpretation of my tests.

Additional Analyses

The Impact of Analyst Effort

A potentially important factor affecting analysts' ability to uncover private information about a firm's R&D activities is the intensity of analyst effort devoted to covering the firm. Specifically, analysts may be more successful in uncovering private information for firms that they follow more intensely. Barth et al. (2001) use the total number of firms covered by an analyst as a proxy for the intensity of coverage devoted by an analyst to a particular firm based on the idea that an analyst's ability to devote attention to a given firm decreases as the total number of firms in the analyst's portfolio increases. I examine whether the association between analyst coverage and the market's valuation of R&D capital depends on analyst effort. In untabulated tests, I find no evidence that the impact of analyst coverage depends on average analyst effort. Failure to document a significant effect of analyst effort likely reflects the crudeness of the effort measure.[18]

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[17] As discussed in Section II, this evidence includes: (1) substantial returns to insider trade for R&D-intensive firms, consistent with the managers of such firms having an informational advantage (Aboody and Lev 2000), (2) the substantial returns to a trading strategy formed on the basis of the estimated magnitude of unrecorded R&D assets (Penman and Zhang 2002) (3) extensive repurchase activity for R&D-intensive firms, consistent with managers of such firms believing their firms to be consistently undervalued (Barth and Kasznik 1999), (4) greater analyst coverage for R&D-intensive firms consistent with analysts believing the stock prices of such firms to be less informative due to the information void surrounding R&D assets (Barth et al. 2001), and (5) the higher bid-ask spreads, stock return volatility, and analyst forecast dispersion for R&D-intensive firms, consistent with a lack of precision in the information held by investors and analysts (Chan et al 2001; Boone and Raman 2001; Barron et al. 2002).

Numerator versus Denominator Effects

I perform additional analysis to shed light on the degree to which my results are driven by numerator (i.e., better forecasts of R&D payoffs) versus denominator (i.e., lower cost of capital as the result of more precise information) effects. If the results I document are driven primarily by financial statement recognition and/or analyst following leading to an overall lower cost of capital, then recognition and/or analyst following should lead to higher multiples on *non-R&D assets* in addition to the R&D assets. To investigate this possibility, I augment Equation (1) to include the following additional interaction terms: *NETASSETS* × *RECOGNIZED* and *NETASSETS* × *logCOVERAGE*. The additional interaction terms capture the differential effects of financial statement recognition and analyst coverage on the market's valuation of non-R&D assets. The results of estimating this expanded model indicate that neither of the additional interaction terms is significant. Because the effects of financial statement recognition and analyst coverage do not extend to the non-R&D assets, the results I document do not appear to be driven primarily by cost of capital (i.e., denominator) effects.

Impact of Measurement Error or Bias in the R&D Fair Value Estimates

This study relies on the assumption that the estimated fair values disclosed by the acquirer are accurate and unbiased reflections of the expectations held by privately informed managers. This assumption may not be met if the estimates are perturbed by either measurement error or bias. Measurement error arises if managers devote inadequate attention to translating their private information into the fair value estimates while bias arises if acquirers systematically intervene in the calculation of the fair value estimates in order to achieve some financial reporting objective. Measurement error and bias have different implications for the tests reported in this paper. Measurement error reduces the power of the tests and works against my ability to document this paper's findings. Systematic bias poses a more serious problem in that it may lead to faulty inferences *if* the bias is correlated with the two primary variables of interest: analyst coverage and financial statement recognition.

Ex ante, I seek to reduce the likelihood of either measurement error or bias by choosing the sample period to coincide with the passage of SFAS No. 141 and with the simultaneous issuance by the AICPA of formal guidance on the preparation of and review by auditors of estimated R&D fair values. Both events reduce the possibility that the estimated fair values of R&D capital reported by the acquirers in this study are perturbed by significant measurement error and bias.

Nevertheless, the possibility of measurement error or bias in the R&D value estimates still exists in the post-SFAS No. 141 regime. Because measurement error reduces the power of the tests and works against the findings I document, I focus my supplemental analysis on assessing the degree to which there is systematic bias in the R&D estimates that may be driving the reported results. It is not clear *ex ante* why characteristics of the target's pre-merger announcement information environment should be systematically related with the acquirer's incentives to bias R&D fair value estimates in a particular direction. In addition, the fact that the most often alleged bias associated with acquirers' R&D estimates is the systematic inflation of IPRD estimates while the documented impacts of analyst coverage and financial statement recognition are not attributable to the in-process R&D component of R&D capital reduces the likelihood that systematic bias in the R&D estimates is contributing to the observed results. Moreover, recall from the earlier discussion that I find no indication that the acquirers' shareholders perceive amounts assigned to in-process R&D amounts to be inflated relative to developed technology.

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[18] Specifically, the effort variable implicitly assumes that an analyst devotes equal attention to all firms in her portfolio. Thus, the measure provides no way to distinguish between: (1) an analyst who covers 5 firms where 90 percent of her attention is devoted to one firm and 10 percent of her attention is devoted to the remaining four firms and (2) an analyst who also covers five firms but devotes one-fifth of her attention to each of the five firms in her portfolio.

Nevertheless, I examine whether there is any evidence of a systematic bias in the R&D fair value estimates that is correlated with analyst coverage or the amount of R&D intangibles recognized by the target. I focus on the systematic inflation of IPRD amounts because, as stated previously, it is the most frequently alleged bias. Specifically, I analyze the determinants of the percentage of the total fair value of assets that is allocated to IPRD. After controlling for the relative size of the merger to the acquirer as well as industry and yearly fixed effects, I find no evidence that the proportion of the purchase price allocated to IPRD is related to either analyst coverage of the target prior to the merger announcement or to the target's recognition of R&D assets prior to the merger announcement. This finding bolsters confidence that the results reported in this paper do not appear to be driven by managerial bias that is somehow correlated with the variables of interest.

V. CONCLUSIONS AND LIMITATIONS

For a sample of 150 mergers between publicly traded acquirers and targets, I examine whether analyst coverage of the target prior to the merger announcement and/or financial statement recognition of research and development (R&D) assets by the target prior to the merger announcement influence how fully the target's pre-merger announcement share price reflects the acquirer's estimate of the fair value of the target's R&D capital.

I find that the degree to which a target's pre-merger announcement equity value reflects the estimated fair value of its R&D capital is increasing in the amount of R&D-related intangibles captured in the target's pre-merger announcement balance sheets and in the number of analysts covering the target prior to the merger announcement. This evidence is consistent with the notion that both financial statement recognition and analysts' private information search activities lead to the revelation of private information about the value of R&D assets that investors incorporate into equity values. I further find that the positive relation between analyst following and the market's valuation of R&D capital is limited to the portion of the estimated fair value of R&D capital that is unrecognized by the target prior to the merger announcement. This finding is consistent with analysts filling in the information gap left by the lack of financial statement recognition.

This study's findings are subject to a number of caveats. First, it is possible that the effect of recognition I document may be driven by the events giving rise to recognition and not by recognition itself. Second, although I fail to find evidence of systematic bias in the R&D fair value estimates, it remains possible that my assumption that the reported fair value estimates are unbiased reflections of the acquirer's assessment of the fair value of the target's R&D capital may not hold. Third, the possibility exists that my assumption that managers (whose expectations are reflected in the R&D fair value estimates) are better informed than the market about the value of their firms' R&D capital may not strictly hold. If this is the case, then it is possible that my tests can be alternatively interpreted as documenting the extent to which the acquirer relies on the superior information contained in the target's pre-merger announcement merger capitalization when preparing the R&D

fair value estimate. In assessing whether this possibility poses a serious concern for this study, I appeal to the collective weight of past empirical research, which is consistent with managers having a significant informational advantage about their R&D relative to the market. Moreover, the implementation guidance provided by the AICPA (2001) emphasizes the use of non-market-based information in calculating the value of R&D assets. The guidance reduces, although it does not eliminate, the possibility that acquirers rely exclusively on the target's prior market capitalization when valuing the R&D asset.

Subject to these caveats, this study's findings support the contention that greater recognition of R&D capital leads investors to more completely appreciate its value while, at the same time, supporting Barth et al.'s (2001) suggestion that analysts can serve as an alternative source of information about R&D capital in the absence of financial statement recognition. This study's evidence on how existing mechanisms inform investors about the value of R&D capital is important as standard setters consider ways to either encourage or mandate greater information production about intangible assets.

APPENDIX A
DESCRIPTION OF THE MULTIPERIOD EXCESS EARNINGS APPROACH TO VALUATION OF TECHNOLOGY-RELATED INTANGIBLE ASSETS

SFAS No. 141 requires acquirers to allocate the purchase price of an acquisition to the estimated fair value of the target's identifiable assets and liabilities. The ready tradability of most tangible assets allows their value to be assessed directly by reference to recent transaction or market prices. By contrast, intangible assets typically are not traded and, therefore, do not have readily observable market prices. Therefore, valuation experts must rely on indirect methods when valuing these assets. The most common method used to estimate the value of technology-related intangible assets is the multiperiod excess earnings method. Under this method, the acquirer's detailed forecast of future operating cash flows attributable to current development efforts serves as the primary basis for valuation.

This forecast includes management's projection of the revenues and operating expenses associated with each R&D project as well as management's estimate of the remaining costs to bring each R&D project to completion. Because of SFAS No. 141's requirement that the fair values assigned to each identifiable asset reflect only the value to the target on a stand-alone basis, any anticipated merger synergies are isolated from the cash flow forecast before it is used for valuation purposes.

Although the forecast is prepared by management, valuation experts seek to establish its validity through discussions with management and development professionals as well as through inspection of internal documents, such as the target's R&D budget, the target's R&D planning documents and related status reports, historical records on R&D costs incurred by project, and estimated costs to complete the project.[19] Based on these discussions and reliance on internal documents, the valuation expert seeks to understand, for each project, (1) the project's stage of completion, (2) the importance of the project in the company's product roadmap for the technology, (3) the remaining technological or regulatory risks to be over come, (4) the remaining time to completion and the remaining development costs to be incurred, and (5) the probability of successful completion. Upon determination that management's forecast can be relied upon, the valuation expert deducts from forecasted future cash flows capital charges for other identified tangible and intangible assets that conceptually contribute to the generation of the forecasted future cash flows. The sum of the forecasted cash flows in excess of these capital charges discounted at an appropriate discount rate (typically the company's estimated weighted average cost of capital plus a premium that varies based on the assessed riskiness of the firm's R&D projects) represent the appraised fair value of the R&D project typically recognized by acquirers in business combinations.

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[19] The AICPA's practice guide on valuing R&D Capital in connection with business combinations states: "Prospective Financial Information (PFI) provided by management that is accepted by the valuation specialist without having been subjected to validating procedures by the valuation specialist would contradict the performance of best practices . . . The valuation specialist does not simply accept PFI from management without investigating its suitability for use in the valuation analysis. The valuation specialist is responsible for evaluating the methodology and assumptions used by management in preparing the PFI and concluding whether the PFI is appropriate for use in valuing the assets acquired."

APPENDIX B
SAMPLE PURCHASE PRICE ALLOCATION—ACQUISITION OF CIMA LABS INC.

On August 12, 2004, we completed our acquisition of CIMA LABS INC. Under the Agreement and Plan of Merger dated November 3, 2003, we acquired each outstanding share of CIMA LABS common stock for $34.00 per share in cash. The total cash paid to CIMA LABS stockholders in the transaction was approximately $482.5 million, net of CIMA LABS' existing cash on hand, or $409.4 million, net of its cash, cash equivalents, and investments. As a result of the acquisition, we obtained the rights to CIMA LABS' ORAVESCENT fentanyl® product candidate, which is currently in Phase 3 clinical trials for the treatment of breakthrough cancer pain in opioid-tolerant patients. ORAVESCENT fentanyl utilizes an enhanced absorption transmucosal drug delivery technology that we believe may facilitate the rapid onset of pain relief in such patients. We are targeting approval of this product by the FDA in late 2006.

The total purchase price of $514.1 million consists of $500.1 million for all outstanding shares of CIMA LABS at $34.00 per share and $14.0 million in direct transaction costs. The acquisition was funded from Cephalon's existing cash and short-term investments. In connection with the acquisition, CIMA LABS used $18.8 million of their own funds to purchase all outstanding employee stock options, whether or not vested or exercisable, for an amount equal to $34.00 less the exercise price for such option.

The following table summarizes the estimated fair values of assets acquired and liabilities assumed at the date of acquisition.

	At August 12, 2004
Cash and cash equivalents	$31,604
Available-for-sale investments	73,169
Receivables	8,821
Inventory	6,224
Deferred tax asset, net	17,985
Other current assets	555
Property, plant, and equipment	82,474
Intangible assets	113,100
Acquired in-process research and development	185,700
Goodwill	71,843
Total assets acquired	591,475
Current liabilities	(32,783)
Deferred tax liability	(44,567)
Total liabilities assumed	(77,350)
Net assets acquired	$514,125

Of the $113.1 million of acquired intangible assets, $70.0 million was assigned to the DuraSolv® technology with an estimated useful life of 14 years, $32.7 million was assigned to the OraSolv® technology with a weighted average estimated useful life of approximately 6 years, and $10.4 million was assigned to the developed ORAVESCENT technology with an estimated useful life of 15 years. The $71.8 million of goodwill was assigned to our single biopharmaceutical segment. In accordance with SFAS No. 142, goodwill is not amortized, but will be subject to a periodic assessment for impairment by applying a fair-value-based test. None of this goodwill is expected to be deductible for income tax purposes.

We believe our purchase price allocation will be finalized during the first quarter of 2005. We allocated $185.7 million of the purchase price to in-process research and development projects.

In-process research and development (IPR&D) represents the valuation of acquired, to-be-completed research projects. At the acquisition date, CIMA LABS' ongoing research and development initiatives were primarily involved with the development and commencement of Phase 3 clinical trials of ORAVESCENT fentanyl for the treatment of breakthrough cancer pain in opioid-tolerant patients, and several other minor ongoing research and development projects. At the acquisition date, CIMA LABS had spent approximately $5.6 million on the ORAVESCENT in-process research and development project. During the remainder of 2004, we spent an additional $2.5 million on the project, and we expect to spend an additional $8.0 million through 2005. We expect to complete our ORAVESCENT fentanyl Phase 3 clinical trials and submit an NDA for approval of this product in late 2005. The estimated revenues for the in-process projects are expected to be recognized from 2006 through 2019.

The value assigned to purchased in-process technology was determined by estimating the costs to develop the acquired technology into commercially viable products, estimating the resulting net cash flows from the projects, and discounting the net cash flows to their present value. The revenue projections used to value the in-process research and development were, in some cases, reduced based on the probability of developing a new drug, and considered the relevant market sizes and growth factors, expected trends in technology, and the nature and expected timing of new product introductions by us and our competitors. The resulting net cash flows from such projects are based on management's estimates of cost of sales, operating expenses, and income taxes from such projects. The rates utilized to discount the net cash flows to their present value were based on estimated cost of capital calculations. Due to the nature of the forecast and the risks associated with the projected growth and profitability of the developmental projects, discount rates of 28 percent were considered appropriate for the in-process research and development. These discount rates were commensurate with the projects' stage of development and the uncertainties in the economic estimates described above.

If these projects are not successfully developed, the sales and profitability of the combined company may be adversely affected in future periods. Additionally, the value of other acquired intangible assets may become impaired. We believed that the foregoing assumptions used in the in-process research and development analysis were reasonable at the time of the acquisition. No assurance can be given, however, that the underlying assumptions used to estimate expected project sales, development costs or profitability, or the events associated with such projects, will transpire as estimated. At the date of acquisition, the development of these projects had not yet reached technological feasibility, and the research and development in progress had no alternative future uses. Accordingly, these costs in the amount of $185.7 million were charged to expense in the third quarter of 2004.

Panel C: Coding of Purchase Price Allocation

Variable	Amount (millions)
NETASSETS	215.3
RDCAPITAL	298.8
DEVELOPED	113.1
INPROCESS	185.7

Source: The discussion in Appendix A is primarily based on my discussions with several valuation experts as well as the implementation guidance provided by the AICPA (2001) and Mard et al. (2002).
See Table 3 for variable definitions.

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When Security Analysts Talk, Who Listens?

Michael B. Mikhail
Arizona State University

Beverly R. Walther
Northwestern University

Richard H. Willis
Vanderbilt University

ABSTRACT: Regulators' interest in analyst reports stems from the belief that small investors are unaware of the conflicts sell-side analysts face and may, as a consequence, be misled into making suboptimal investment decisions. We examine who trades on security analyst stock recommendations by extending prior research to focus on investor-specific responses to revisions. We find that both large and small traders react to analyst reports; however, large investors appear to trade more than small traders in response to the information conveyed by the analyst's recommendation and earnings forecast revision (proxied by the magnitudes of the recommendation change and the earnings forecast revision, respectively). We also find that small investors do not fully account for the effects of analysts' incentives on the credibility of analyst reports, as captured by the type of recommendation (i.e., upgrade versus downgrade or buy versus sell). In particular, small investors not only trade more than large investors following upgrade and buy recommendations, but also trade more following upgrade and buy recommendations than they do following downgrade and hold/sell recommendations. Furthermore, we observe that, on average, small traders are net purchasers following recommendation revisions regardless of the type of the recommendation; large traders tend to be net sellers following downgrades and sells. Consequently, large

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traders generate statistically positive returns from their trading, while small traders generate statistically negative returns from their trading. These findings are consistent with large investors being more sophisticated processors of information, and provide some support for regulators' concerns that analysts may more easily mislead small investors.

Keywords: *security analysts; stock recommendations; trading volume; investor sophistication.*

Data Availability: *The data used in this study are publicly available from the sources indicated in the text.*

I. INTRODUCTION

We examine who trades in response to sell-side security analyst reports by extending prior research to focus on investor-specific responses to recommendation revisions. Regulators' current interest in analyst stock recommendations stems from the belief that investors, and in particular small or unsophisticated investors, may make suboptimal investment decisions because they are unaware of the incentive conflicts analysts face.[1] While regulators' concerns are predicated on small investors being harmed by biased research, little evidence exists documenting that small investors react to stock recommendations, or that their reactions do not reflect how the incentives analysts face affect their reports' credibility.[2]

We investigate whether the trading activities of small and large investors are associated with the abnormal volume and returns surrounding security analyst recommendation revisions. We also examine whether individual investor responses to recommendation revisions vary with the credibility of the analyst's recommendation. Moreover, to provide initial evidence on regulators' concern that small investors are misled into making suboptimal investment decisions, we investigate returns earned by each investor type. Although not a focus of regulators, we also investigate differences in individual investor responses to earnings forecast revisions that accompany recommendation revisions to provide additional evidence on investor reactions to the primary elements contained in an analyst's report.

Given analysts' reluctance to issue negative recommendations for the companies they cover (see, e.g., Opdyke 2002; Santoli 2001), we use the direction of the change (upgrade versus downgrade) and the level (buy versus sell) of the revised recommendation to proxy for report credibility. For reasons discussed in Section IV, we argue that upgrades/buys are less credible than downgrades/sells. Following prior research, we use trade size to distinguish between large ("sophisticated") and small ("unsophisticated") investors (see, e.g., Bhattacharya 2001; Bhattacharya et al. 2004; Lee 1992; Lee and Radhakrishna 2000). We use large traders' reactions to recommendation revisions as a benchmark against which to compare small traders' reactions. If regulators' concerns are founded, we expect to see significant differences between large and small traders in their reactions to recommendation revisions.

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[1] Ten Wall Street firms agreed to pay $1.4 billion and to provide their clients with an independent source of equity research to resolve charges that they promoted stocks and produced biased research reports during the late 1990s. New York Attorney General Eliot Spitzer stated that $400 million of the settlement would be used to create a restitution fund to reimburse losses suffered by "small investors led astray" (Opdyke and Simon 2003).

[2] The 1990s bull market and the availability of low cost investing through online brokerage accounts greatly increased the level of small investor participation in the stock market and, hence, regulators' concerns. 51 percent of U.S. households invest in the securities markets and 14 percent of this number conducted an online equity transaction in 2004 (Investment Company Institute and Securities Industry Association 2005).

We find that both large and small investors react to recommendation revisions; however, how they react differs. While large investors trade more in response to the information conveyed by the analyst's recommendation and earnings forecast revision, small investors trade more in response to the *occurrence* of a recommendation. We also find that small investors trade more than large investors in response to upgrades and buys, which we argue are less credible. These findings are consistent with large traders better understanding analysts' disincentives to downgrade their recommendations or to issue holds/sells.

Notably, we document that small traders are net purchasers following recommendation revisions *regardless* of the type of the recommendation. In contrast, large traders tend to be net sellers following downgrades and sells, consistent with more sophisticated information processing. Hence, large traders, on average, earn statistically positive returns from their trading in response to recommendation revisions, while small traders, on average, earn statistically negative returns. Thus, given our estimates of the returns earned (based on assumed holding periods and ownership positions) by each trader type, our findings provide some evidence supporting regulators' belief that small or unsophisticated investors are unaware of the conflicts analysts face and make suboptimal investment decisions as a result.[3]

Understanding investor responses to analyst reports is important for at least two reasons. First, the Securities and Exchange Commission (SEC)'s primary mission is "to protect investors and maintain the integrity of the securities markets."[4] In addition to replicating the findings in prior work on the extent to which small trader behavior differs from that of large, more sophisticated, traders (see, e.g., Lee 1992), we document the implications of these different trading behaviors on the returns earned by each investor group. Our results provide evidence, which may support regulators' concerns, that small investors make suboptimal investment decisions because they are unaware of the potential conflicts analysts face. Our investigation also speaks to the motivation underlying the SEC's adoption of Regulation Analyst Certification (Regulation AC, SEC 2003, §1), which is intended to bolster investor confidence in the securities markets by increasing investor confidence in the quality of analysts' research reports. Regulation AC, effective April 14, 2003, requires stock analysts (and others) who issue a report on a security to certify in their report that the views expressed are accurate reflections of their personal views; they must also disclose if they were compensated for the views expressed.

Second, we document systematic differences in the reaction to recommendation and earnings forecast revisions between large and small traders, consistent with Lee's (1992) findings, suggesting that his results are not unique to earnings announcements. Investigating small and large trading behavior surrounding recommendation revisions provides additional insights into two explanations Lee (1992) forwards for his results. First, he conjectures that small traders are net buyers following earnings announcements, irrespective of the news contained therein, because of the "attention effect" (see also Barber and Odean 2006). The attention effect posits that the amount of attention given to the announcement, and not the news content of the event per se, triggers small investor buying. Consistent with the attention effect, we find that small traders, on average, trade more than large traders after recommendation revisions; our results, however, are not solely attributable to an attention effect. Specifically, because bad news recommendations generally are associated with more extensive attention (as evidenced by the larger abnormal returns surrounding bad news recommendations versus good news recommendations), a pure attention effect predicts that small traders should trade more following downgrades and hold/sell recommendations. We find, however, that the abnormal volume for small traders is greater for upgrades and strong buy/buy recommendations. Second, Lee (1992) conjectures that small investors' reliance on investment advisors' heavily one-sided advice is associated with their observed trading patterns around earnings announcements. Our results, suggesting that small investors do not fully account for the incentives analysts face to be optimistic when reacting to analyst recommendations, support Lee's (1992) explanation.

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[3] In a different setting, Asthana et al. (2004) document mean negative (positive) returns for small (large) traders surrounding Form 10-K filings—a result they conjecture could be attributable to small investors' informational disadvantage relative to that of large traders.

[4] The SEC's mission statement is available at: http://www.sec.gov/about/whatwedo.shtml.

In Section II, we review prior research. In Section III we summarize methodological considerations and the sample. We present the empirical results in Section IV, followed by our conclusions in Section V.

II. PRIOR RESEARCH

Our paper is related to two strands of prior research. One strand has investigated share price and trading volume associations with stock recommendation revisions; another strand has investigated how different classes of traders react to information releases.

Market-Level Reactions to Recommendation Revisions

Prior work documents that investors react to stock recommendation revisions. For example, Stickel (1995) and Womack (1996) document a significantly positive (negative) price reaction to upgrades (downgrades), with the market response to downgrades being more severe. Womack (1996) finds a similar asymmetry in event day trading volume with approximately double (triple) normal volume for stocks upgraded (downgraded) in his sample of extreme recommendation revisions from large U.S. brokerages (see also Barber and Loeffler [1993] who examine a sample of buy recommendations published in the *Wall Street Journal*).

The share price response to recommendation revisions has also been shown to vary cross-sectionally based on brokerage, firm, and analyst characteristics. Stickel (1995) establishes that the market reacts more positively (negatively) to upgrades (downgrades) from analysts working at larger brokerage houses or following smaller firms. Furthermore, recommendation revisions from more experienced analysts (Mikhail et al. 1997) or analysts with a track record of issuing more profitable recommendations (Mikhail et al. 2004) generate larger abnormal returns. Lin and McNichols (1998) find that hold recommendations from affiliated analysts, those employed by a brokerage with a banking relationship with the followed firm, earn significantly more negative abnormal returns (see also Asquith et al. 2005), suggesting positive recommendations from affiliated analysts are less credible given their heightened disincentives to report negatively. Consistent with this finding, Michaely and Womack (1999) and Malmendier and Shanthikumar (2007) document lower returns (approximately 13 percent to 15 percent a year) from following affiliated analysts' recommendations.

Collectively, this work examines market-level price and volume responses to recommendation revisions and cross-sectional variation in the share price response. It does not, however, investigate which type of investor trading, small or large, is associated with those responses, the literature we summarize next.

Investor-Level Reactions to Information Releases

Prior studies examining how different classes of traders react to new information have generally focused on earnings-related releases. Lee (1992) finds that large and small traders exhibit an increase in volume in the period immediately surrounding earnings announcements, suggesting that both large and small traders react to earnings news. However, large traders' reactions are greater overall, and they tend to buy (sell) following good (bad) earnings news. In contrast, good *and* bad news triggers unusually high buying activity for small traders (see also Shanthikumar 2004a).

Bhattacharya (2001), Bhattacharya et al. (2004), and Battalio and Mendenhall (2005) similarly document differences in the reliance on earnings-related information between large and small traders. Bhattacharya (2001) finds that small traders' earnings expectations are positively associated with predictions from a seasonal random walk forecast model, but are unrelated to the generally more accurate analyst forecasts; the abnormal trading volume for large traders is unrelated to the naïve seasonal random walk forecast error (see also Walther 1997). Battalio and Mendenhall (2005) provide further evidence that small traders' net buying activity is associated with signed seasonal random walk forecast errors, whereas large traders' net buying activity is associated with signed analyst forecast errors. Bhattacharya et al. (2004) find that the abnormal trading response for small investors is significantly associated with the unsigned forecast error based on pro forma earnings, while large traders' reactions are not. Their evidence indicates that trading around pro forma earnings releases, an earnings disclosure subject to greater potential managerial manipulation, is primarily attributable to small traders. Collectively, these studies suggest that small traders are less sophisticated in their interpretation of earnings-related disclosures (see also Bhattacharya et al. 2003).[5] However, none of this prior work documents the negative financial consequences associated with the suboptimal decisions that stem from small investors' lack of sophistication. Our study advances this literature by providing direct evidence on this issue.

In contrast to this prior work, we employ a simple signal to test sophistication—an explicit recommendation to buy or sell a particular firm's stock. In many respects, the finding in prior work that small investors are unable to appropriately process the information in earnings is not surprising. Unlike the recommendation revisions used in this study, an investor cannot appropriately react to an earnings announcement without an understanding of a variety of accounting-based decisions that manifest themselves in a firm's reported earnings.[6] Consistent with the greater difficulty in interpreting earnings-related information, Malmendier and Shanthikumar (2006) argue that recommendations are directed to individual investors, while forecasts are directed to institutional investors. Similar to Lin and McNichols (1998), they document that affiliated analysts are inclined to issue overly optimistic stock recommendations, but not earnings forecasts—a finding they attribute to the difficulty individuals have in assessing the stock price impact of a given dollar amount of earnings. By focusing on a simple signal such as a stock recommendation, we overcome many of the difficulties inherent in interpreting earnings.

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[5] These differences in information used by large and small investors are not confined to current information. Shanthikumar (2004b) finds that small traders' reactions to a positive earnings surprise in the current quarter depend on whether the prior surprises were positive; large traders do not condition their reaction on the prior series.

[6] For example, most small investors are unlikely to have an appreciation of how items such as revenue recognition rules, one time gains and losses, or off-balance-sheet entities may affect a firm's current and future earnings. In order to appropriately interpret an earnings announcement, an investor must also be able to understand how accounting earnings relate to stock returns.

Malmendier and Shanthikumar (2007) also examine the trade imbalance of large and small investors surrounding stock recommendations and find results similar to ours.[7] They show that a naïve investment strategy of taking a long (short) position in the stock when the analyst issues a strong buy/buy (strong sell/sell) recommendation yields negative buy-and-hold abnormal returns. They also document a negative association between the post-recommendation returns in the stock and the net buying activity of small traders surrounding the recommendation issuance. In contrast to their study, we also examine small and large traders' assessment of the information conveyed by analysts' reports, including their earnings forecast revisions, and control for other variables previously shown to affect investors' reactions to recommendation revisions. Furthermore, we use the more refined approach developed by Asthana et al. (2004) to calculate the returns earned by large and small investors (see Section IV).

III. SAMPLE AND DESCRIPTIVE STATISTICS

Data

We obtain the dates and values of recommendations issued by individual analysts during 1993 to 1999 from the Zacks Investment Research (Zacks) database. The sample period begins in 1993, the first year for which transaction level Trade and Quote (TAQ) data are available. The sample period ends in 1999, prior to the implementation of Regulation AC, to enhance our ability to detect any differences in small and large investor trading behavior.[8] The Zacks database contains a unique analyst identifying code that allows us to follow an analyst through time, regardless of his employer. Using these analyst codes, we eliminate recommendations attributable to an unidentified individual, a brokerage house, or a broker merger. Furthermore, we require the current and previous recommendation be available on Zacks to determine an analyst's revision or reiteration.[9] Because prior research (e.g., Mikhail et al. 2004) documents an insignificant market response to reiterations, we eliminate them. All findings hold if we include reiterations in our final sample (results not tabulated).

We gather transaction level data from TAQ. This database contains intraday trades and quotes for all securities listed on the New York and American Exchanges (NYSE) and the NASDAQ market. To ensure that the observed trading is attributable to the release of the recommendation, we eliminate recommendations with an earnings announcement or dividend announcement in the five-day window centered on the recommendation release date.

Using transaction level data, we follow prior research and use two methods to identify large and small traders. One method uses the number of shares traded; the second method uses the dollar value of shares traded. Lee and Radhakrishna (2000) find that the dollar value of the trade better discriminates between large and small traders because it is less sensitive to stock price changes. Therefore, we tabulate the results using the dollar-denominated measure to categorize trades; all results hold using the share-based method. We assume that small trades (hereafter, "small traders") are executed by less sophisticated traders, while large trades ("large traders") are executed by more sophisticated investors.

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[7] He et al. (2005) extend our work and Malmendier and Shanthikumar (2007) by examining investor trading conditional on an analyst's status as an All-America Research Team member. They find that large and small investors react to All-Star analysts while large traders tend to ignore non-All-Star analysts.

[8] Although Regulation AC was effective April 14, 2003, the final rule states that the Securities and Exchange Commission and Congress began investigating biased analyst reporting in 1999.

[9] Zacks assigns each analyst's recommendation a value from 1.0 (strong buy) to 5.0 (strong sell), with a rating of 6.0 indicating that the analyst has initiated or discontinued coverage. If the analyst provides his recommendation to Zacks on a different scale, then Zacks converts the recommendation to a five-point scale. We require that the previous recommendation be issued less than one year before the current recommendation.

We consider three dollar-value classifications to identify large and small traders. We define dollar trades greater (less) than (1) \$30,000 (\$7,000); (2) \$50,000 (\$5,000); or (3) \$10,000 (\$10,000) as large (small) trades. The first two methods are generally preferable; prior research concludes that eliminating medium-sized dollar trades increases the statistical power to distinguish between large and small traders (see, e.g., Lee and Radhakrishna 2000) because informed traders may break up their trades to hide their information advantage. Chakravarty (2001) reports that 79 percent of institutional stealth trading occurs in medium-sized trades (see also Barclay and Warner 1993). Thus, eliminating medium-sized trades reduces the possibility of misclassification. Regardless, our results are insensitive to the cut-offs used, so we tabulate only the first approach.

After requiring CRSP and Compustat data to calculate our excess return measure and control variables (described below), our final sample contains 50,076 recommendation changes (22,538 upgrades and 27,538 downgrades) during 1993 to 1999 issued by 2,794 analysts covering 5,419 firms. The sample analysts have been included on the Zacks database for a mean (median) of 7.8 (6.0) years. The distribution of the sample recommendations is consistent with prior research: 58.2 percent of the revised recommendations are strong buy or buy; 35.6 percent are hold; 6.2 percent are strong sell or sell (see, e.g., Mikhail et al. 2004).

Following Lee (1992), we use the firm's closing share price as of the end of the previous calendar year to calculate the largest number of round-lot (100) shares greater than or equal to \$30,000 (less than or equal to \$7,000); these trades represent large (small) trades.[10] We eliminate observations with year-end share prices less than \$1 and greater than \$500 to reduce the influence of extreme observations on the empirical results. For each trader group we calculate abnormal volume as:[11]

$$AVOLUME^{j}_{i,k,t} = \left[\frac{\begin{array}{l}\text{Dollar trading volume for firm } i\\ \text{in investor group } j \text{ during}\\ (t=-2,+2) \text{ window surrounding}\\ \text{analyst } k\text{'s recommendation}\\ \text{revision at } t\end{array} - \begin{array}{l}\text{Average dollar trading}\\ \text{volume for firm } i \text{ in investor}\\ \text{group } j \text{ during } (t=-2,+2)\\ \text{non overlapping windows}\\ \text{during the year}\end{array}}{\begin{array}{l}\text{Average dollar trading volume of firm } i \text{ in investor group } j\\ \text{during } (t=-2,+2) \text{ non-overlapping windows during the year}\end{array}} \right] \times 100. \tag{1}$$

Descriptive Statistics

Table 1 contains descriptive information on our sample. Panel A contains statistics for the abnormal volume measures and indicates that the median abnormal volume measure for small (large) investors, $AVOLUME^{SMALL}$ ($AVOLUME^{LARGE}$), is 62.52 percent (53.94 percent). Thus, during the five-day window surrounding a recommendation revision, both small

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[10] Because the calendar year-end price of a stock may change significantly in the subsequent year, we also use the price at day $t = -3$, the trading day immediately preceding our short event window, to calculate the number of round lot shares to classify large and small investors. These breakpoints are very similar to what we employ.

[11] The TAQ database does not indicate whether a trade was triggered by a buy or sell order. In unreported tests, we recalculate our measure of abnormal trading volume using the algorithm developed by Lee and Ready (1991) to infer whether a trade observation was initiated by a buy or sell order (see also Lee and Radhakrishna 2000). All our inferences are unchanged using abnormal buy and sell volume measures in our regressions (see also Section IV).

TABLE 1
Sample Descriptive Statistics

Variable	Mean	Median	First Quartile	Third Quartile
Panel A: Trade Size, Market Volume, and Return Measures				
$AVOLUME^{SMALL}$	169.70%	62.52%	−2.20%	183.74%
$AVOLUME^{LARGE}$	188.28%	53.94%	−17.46%	197.17%
AMKTVOL	0.17%	−1.28%	−6.80%	6.02%
ABS_BHAR	6.55%	3.69%	1.58%	7.94%
Panel B: Recommendations				
#DAYS	131.93	113.00	53.50	199.00
Upgrades	125.60	102.00	47.00	189.00
Downgrades	137.12	121.00	58.00	207.00
Buys	130.49	111.00	50.00	198.00
Holds and Sells	133.94	117.00	57.00	200.00
ABSRCHG	1.32	1.00	1.00	2.00
Upgrades	1.30	1.00	1.00	2.00
Downgrades	1.34	1.00	1.00	2.00
Buys	1.20	1.00	1.00	1.00
Holds and Sells	1.48	1.00	1.00	2.00
Panel C: Analyst and Firm Characteristics				
#FIRMS	26.18	22.00	17.00	31.00
#INDUSTRIES	7.14	6.00	4.00	9.00
BROK_SIZE	57.01	41.00	19.00	82.00
MKT_VALUE ($MM)	6,716.93	1,060.09	291.43	4,229.23
PRIOR_PERF	1.94	2.00	1.00	3.00

This table provides descriptive statistics on the sample, which consists of 50,076 observations during 1993 to 1999. Panel A provides trade size and volume measures for all observations in the sample. $AVOLUME^{SMALL}$ ($AVOLUME^{LARGE}$) is the abnormal dollar volume for small (large) traders in the five-day window centered on the recommendation release date (see Equation (1)). *AMKTVOL* is the abnormal market volume during this five-day window. *ABS_BHAR* is the absolute value of the five-day characteristic-adjusted buy-and-hold excess return.

Panel B provides information on the sample recommendations for the overall sample, separately for upgrades and downgrades, and separately for buy and hold/sell recommendations. *#DAYS* is the number of calendar days between the issuance of the new recommendation and the prior recommendation. *ABSRCHG* is the absolute value of the difference between the new recommendation and prior recommendation, both measured on a five-point scale.

Panel C provides analyst and firm characteristic measures. *#FIRMS* (*#INDUSTRIES*) is the number of firms (two-digit SIC codes) the sample analysts follow during the year. *BROK_SIZE* is the number of analysts employed by the sample brokerage houses during the year. *MKT_VALUE* is the market value of equity of the sample firms. *PRIOR_PERF* is the sample analysts' quintile ranking based on the relative profitability of their stock recommendation revisions (long in upgrades; short in downgrades) issued in the prior year.

and large investors tend to increase their trading volume by over 50 percent versus non-event periods. While the median abnormal volume measure for small investors is greater than that for large investors (Wilcoxon Z-statistic = 12.38, two-tailed $p < 0.01$), indicating that small investors generally trade more than large investors around revisions, the mean indicates the reverse (t-statistic = −2.61; two-tailed $p < 0.01$).

In our multivariate tests, we control for unusual market-wide movements in volume to separate investor trading in response to general abnormal market movements (attributable, for instance, to macroeconomic shocks) from the volume response to recommendations. We calculate abnormal market volume, *AMKTVOL*, as in Equation (1) but use the total dollar volume of the NYSE/AMEX/NASDAQ. Statistics for this measure, tabulated in Panel A of Table 1, indicate that both the mean and median *AMKTVOL* are statistically different from zero (t-statistic = 3.70, Wilcoxon Z-statistic = 30.27, two-tailed $p < 0.01$). This finding indicates that, typically, there are unusual market-wide movements during the recommendation event windows in our sample, highlighting the need to control for market-wide effects. Because volume measures are positive, reflecting total dollar trading volume in a security on a given day, we measure the price response surrounding recommendations, *ABS_BHAR*, as the absolute value of the five-day buy-and-hold characteristic-adjusted portfolio return centered on the recommendation date.[12] The mean (median) *ABS_BHAR* is 6.55 percent (3.69 percent). Untabulated results indicate that the mean (median) value of the signed *BHAR* measure is 1.79 percent (0.89 percent) for upgrades and −4.00 percent (−1.80 percent) for downgrades. The stronger price response to recommendation downgrades is consistent with prior research (e.g., Asquith et al. 2005; Stickel 1995).

Table 1, Panel B, contains descriptive information on the sample recommendations. Consistent with prior research (e.g., McNichols and O'Brien 1997), the median number of days, *#DAYS*, between recommendation downgrades (121 days) is greater than that for upgrades (102 days; Wilcoxon Z-statistic = 14.83, two-tailed $p < 0.01$). Thus, analysts are slower to revise recommendations down than up (mean comparisons and differences in the mean/median number of days between buys and holds/sells yield similar inferences). We measure the magnitude of the recommendation change, *ABSRCHG*, as the absolute value of the difference between the new and old recommendation, both measured on a five-point scale. The mean (median) recommendation change, *ABSRCHG*, for the sample is 1.32 (1.00).

Table 1, Panel C, contains descriptive information on the sample analysts. We measure *#FIRMS* as the number of firms the analyst follows on Zacks during the year of the recommendation, and *#INDUSTRIES* as the number of two-digit SIC codes to which the firms followed by the analyst during the year belong. *BROK_SIZE* is the number of analysts employed by the brokerage house during the year. These statistics indicate that the median analyst follows 22 firms in six industries, and works for a brokerage employing 41 analysts. The median market value of the followed firms, *MKT_VALUE*, is \$1.060 billion. We measure *PRIOR_PERF* as the quintile ranking of the profitability of the recommendation revisions the analyst issued in the prior year (see Mikhail et al. [2004] for details). *PRIOR_PERF* ranges from 0 (worst relative performance) to 4 (best relative performance); the median (inter-quartile range) of prior performance is 2.00 (2.00).

IV. EMPIRICAL ANALYSES

Investor Trading in Response to Analyst Recommendations

We examine investors' trading responses to analyst recommendation revisions, controlling for other factors correlated with trading volume, by estimating the following regression separately for large and small traders:

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[12] The characteristic-adjusted excess return is equal to the firm's compounded raw return minus the value-weighted compounded return on the characteristic-sorted benchmark portfolio to which the firm belongs in the year of the recommendation change (see Daniel et al. 1997; Wermers 2000).

$$\begin{aligned} AVOLUME^{j}_{i,k,t} = {} & \alpha^{j}_{0} + \alpha^{j}_{1}ABSRCHG_{i,k,t} + \alpha^{j}_{2}FIRM\_SIZE_{i,t-1} \\ & + \alpha^{j}_{3}ABSRCHG_{i,k,t}{*}FIRM\_SIZE_{i,t-1} + \alpha^{j}_{4}BROK\_SIZE_{k,t-1} \\ & + \alpha^{j}_{5}ABSRCHG_{i,k,t}{*}BROK\_SIZE_{k,t-1} + \alpha^{j}_{6}PRIOR\_PERF_{k,t} \\ & + \alpha^{j}_{7}ABSRCHG_{i,k,t}{*}PRIOR\_PERF_{k,t} + \alpha^{j}_{8}AMKTVOL_{t-1} \\ & + \alpha^{j}_{9}ABSRCHG_{i,k,t}{*}AMKTOVOL_{t-1} + \varepsilon^{j}_{i,k,t} \end{aligned} \tag{2}$$

where:

$AVOLUME^{j}_{i,k,t}$ = abnormal trading volume for firm i by investor group j (j = small or large) associated with analyst k's recommendation revision for firm i at time t (Equation (1));

$ABSRCHG_{i,k,t}$ = the absolute value of analyst k's recommendation revision for firm i at time t, calculated by subtracting the previous recommendation (on a scale of 1, strong buy, to 5, strong sell) from the current recommendation;

$FIRM\_SIZE_{i,t-1}$ = firm size, measured using the natural logarithm of the market value of equity for firm i at the end of the year preceding the recommendation revision;

$BROK\_SIZE_{k,t-1}$ = brokerage size, measured as the number of analysts employed by analyst k's brokerage house in the year before his recommendation revision;

$PRIOR\_PERF_{k,t}$ = quintile ranking of analyst k's prior relative performance (ranging from 0, worst, to 4, best), based on the prior year return to analyst k's portfolio of recommendation revisions over the event window $t = -2$ to $t = +60$, where $t = 0$ is the date of the recommendation revision on Zacks;

$AMKTVOL_{t-1}$ = abnormal market volume in year $t-1$, calculated as total market volume surrounding recommendation revision t during $t = -2$ to $t = +2$ less average total market volume during this five-day observation window during year $t-1$; and

$\varepsilon^{j}_{i,k,t}$ = error term.

The intercept in Equation (2) captures the mean abnormal trading volume by investor type after controlling for other factors correlated with volume. In the extreme, if investors ignore analyst recommendation revisions then the estimated intercept will be statistically indistinguishable from zero; such a finding would indicate trading behavior in line with typical levels. If, however, investors respond to analyst recommendation changes, then we predict that the intercept will be positive for both trader types.

The change in an analyst's expectations of firm performance is measured as the (unsigned) magnitude of his recommendation revision (*ABSRCHG*). If *ABSRCHG* captures the strength of arguments accompanying the analyst's revision, as suggested by the findings in Asquith et al. (2005), then larger jumps in the recommendation change should reflect greater revisions in the analyst's expectations of firm performance and generate more trading volume. Although the relation between trading volume and the magnitude of a recommendation revision has not been examined, Mikhail et al. (2004) find a positive relation between abnormal returns and the magnitude of revisions; this evidence suggests a positive association between trading volume and the magnitude of recommendation revisions.[13] Thus, if investors respond to analyst recommendation changes, we predict a positive association between *ABSRCHG* and abnormal trading volume for each trader type.

The remaining variables in Equation (2) are control variables drawn from prior research. We predict that the coefficient estimates on *FIRM_SIZE* and *ABSRCHG*FIRM_SIZE* will be negative; large firms will have less abnormal trading volume given the increased availability of information for these firms (Stickel 1995). In contrast, we predict that the coefficient estimates on *BROK_SIZE* and *ABSRCHG*BROK_SIZE* will be positive; larger brokerages will generate greater trading volume given enhanced marketing ability to disseminate the information to the capital markets (Stickel 1995). Similarly, we expect prior performance (*PRIOR_PERF*) will be positively associated with abnormal volume; analysts with stronger records of making profitable stock recommendations are likely to exhibit persistence in this ability (Mikhail et al. 2004) and, hence, a stronger association with trading volume. Our expectation for the coefficient estimate on *ABSRCHG*PRIOR_PERF*, however, is negative. The market is likely to negatively reassess an analyst's ability because a revision may reflect poorly on the tenability of his prior recommendation (see Trueman 1990). Finally, we predict that the coefficient on abnormal market volume (*AMKTVOL*) will be positive; firm abnormal trading volume will generally be higher when market volume is higher than normal (Bhattacharya 2001).

We estimate Equation (2) for small and large investors separately using seemingly unrelated regression. This technique allows us to conduct statistical tests on coefficient estimates across the large and small investor regression models. Furthermore, in these, and all subsequent, estimations we correct for potential cross-sectional dependence in calculating all test statistics by using the Huber-White estimator (see Huber 1967; White 1980). This procedure addresses cross-sectional dependence caused by multiple recommendation revisions for a given firm by combining individual revisions for the same firm in estimating the variance-covariance matrix. Failure to control for cross-sectional dependence could overstate the statistical significance of our results.

Table 2 provides the results from estimating Equation (2). Consistent with large and small investors increasing their trading in response to analyst recommendation revisions, the estimated intercept is statistically positive for each investor type (two-tailed $p < 0.01$ in both cases). Controlling for other factors correlated with trading volume, we find that small investors double their trading volume in response to recommendation revisions (Intercept = 100.6513); large investors increase trading by approximately 70 percent (Intercept = 71.4572). This difference between small and large abnormal trading volume is statistically significant (χ^2-statistic = 5.73, two-tailed $p < 0.05$). Thus, small investors trade more, on average, than large traders do in response to the *occurrence* of recommendation revisions.[14]

The statistically positive coefficient estimate associated with *ABSRCHG* for each investor type (two-tailed $p < 0.01$) is consistent with more trading volume in response to

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[13] For example, Mikhail et al. (2004) find that upgrades to strong buy from buy (hold) generate 1.64 percent (2.13 percent) in excess returns; downgrades to strong sell from buy (hold) earn −1.58 percent (−1.18 percent).

[14] We consider alternative event windows surrounding the sample recommendation revisions. All inferences are unchanged using an 11-day (i.e., $t = -5$, $t = +5$ where $t = 0$ is the recommendation revision date) event window. We find no evidence of "front running"—that sophisticated (large) trades might occur before the (publicly available) recommendation revision date. Specifically, there are no differences in abnormal trading volume between large and small traders in the 10 trading days preceding the recommendation revision dates.

TABLE 2
Abnormal Trading Volume in Response to Recommendation Revisions

Variable	Trader Type: Large	Trader Type: Small
Intercept	71.4572*** (4.43)	100.6513*** (6.90)
ABSRCHG	67.8792*** (5.89)	48.8644*** (4.86)
FIRM_SIZE	1.6373 (0.82)	−2.6164 (−1.44)
*ABSRCHG*FIRM_SIZE*	−9.0715*** (−6.53)	−6.4842*** (−5.37)
BROK_SIZE	0.2148*** (2.57)	0.2173*** (2.92)
*ABSRCHG*BROK_SIZE*	0.3005*** (4.47)	0.2293*** (3.91)
PRIOR_PERF	13.4561*** (5.00)	16.6182*** (6.61)
*ABSRCHG*PRIOR_PERF*	−5.0621*** (−2.74)	−7.4783*** (−4.45)
AMKTVOL	1.9327*** (5.50)	2.1767*** (6.94)
*ABSRCHG*AMKTVOL*	−0.2072 (−0.82)	−0.2690 (−1.20)
R^2	2.43%*** (84.94)	2.77%*** (99.13)
$\chi^2(1)$: Intercept	5.73**	
$\chi^2(1)$: *ABSRCHG*	5.09**	

, * Statistically different from zero at two-tailed $p < 0.05$ and 0.01, respectively.

This table provides the results from estimating Equation (2) using seemingly unrelated regression techniques. The dependent variable is the abnormal volume for large or small traders over ($t = -2, +2$) ($t = 0$ is the date of the recommendation revision). For each variable in Equation (2), the estimated coefficient is presented.

The Z-statistic is provided in parentheses below the estimated coefficient; the Z-statistics are computed using the Huber-White estimator.

The F-statistic is provided in parentheses below the R^2.

The χ^2 statistic tests whether the specified coefficients are equal across the large and small investor estimations.

FIRM_SIZE is the natural logarithm of the market value of equity at the end of the year preceding the recommendation revision.

Remaining variables are defined in the notes to Table 1.

larger revisions in analysts' expectations of firm performance. For a given one-step increase or decrease in the assigned rating category, small (large) investor abnormal trading volume increases at the margin by 48.9 percent (67.9 percent). The observed difference in *ABSRCHG* across large and small traders is statistically significant (χ^2-statistic = 5.09, two-tailed $p < 0.05$). Given that Asquith et al. (2005) find that analyst reports contain more arguments in support of larger revisions, this result suggests that large traders respond more than small traders to the rationale contained in an analyst's report. To quantify the economic significance of this finding, we note that the coefficient on *ABSRCHG* in response to a one-category revision is approximately 39 percent (67.8792 ÷ 48.8644) higher for large traders than for small traders.[15]

The significant coefficient on *ABSRCHG* for small traders indicates that they also respond to the information conveyed by a recommendation revision, although their sensitivity to *ABSRCHG* is smaller. To investigate this finding further, we examine whether small traders' direction of trade is associated with the type of recommendation revision (upgrade versus downgrade). Untabulated univariate statistics indicate that small traders tend to *buy* the most for large *downgrades* in the recommendation; large traders, on the other hand, sell, on average, for recommendation downgrades. Moreover, large investors' selling increases monotonically with the magnitude of the recommendation downgrade. In contrast, small investors' buying does not vary systematically with the magnitude of the recommendation revision. These results are consistent with more sophisticated processing of information by large traders, but not necessarily small traders.

Regarding the control variables, we highlight two results. First, we find that, while both large and small investors' trading volume responses are tempered as firm size increases (*ABSRCHG*FIRM_SIZE* is statistically negative in both cases), the effect is more modest for small investors (χ^2-statistic = 6.89, two-tailed $p < 0.01$, not tabulated). If size proxies for the amount of information available about a firm, as is commonly assumed, then this result suggests that the difference in behavior between the two types of traders may be due, in part, to large investors' access to alternative sources of information. Second, both investor types rely on an analyst's prior performance in making trading decisions. This result is consistent with the findings in Mikhail et al. (2004) that the stock price reaction to recommendations issued by analysts with a track record of issuing more profitable recommendations is larger. Furthermore, because prior performance is correlated with award status, this finding is consistent with that of He et al. (2005) who document that large and small investors react to All-Star analysts. We find that small traders tend to buy more following high-performing analysts' recommendation revisions, regardless of whether the revision is an upgrade or downgrade (results not tabulated). Specifically, small traders *buy more* following *downgrades* from high-performing analysts, inconsistent with sophisticated information processing. Large traders, on the other hand, sell (buy) more following downgrades (upgrades) from high-performing analysts. Thus, it appears that prior performance may mitigate large traders' credibility concerns associated with upgrades.

Based on Table 2 and the untabulated results discussed above, we conclude the following: although large and small traders react to recommendation revisions, with small investors trading relatively more than large investors in response to the release, large investors appear better able to assess the significance of information conveyed by an analyst's report as captured by the magnitude and direction of a particular revision. That is, large investors trade more in response to the amount of information contained in the analyst's recommendation, rather than simply trading more than average in response to a revision, irrespective of the arguments in support of it.[16]

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[15] If we exclude *ABSRCHG*FIRM_SIZE*, *ABSRCHG*BROK_SIZE*, *ABSRCHG*PRIOR_PERF*, and *ABSRCHG*AMKTVOL* from Equation (2), then the estimated coefficient on *ABSRCHG* remains statistically positive for large traders (9.2909, Z-statistic = 3.76, two-tailed $p < 0.01$), but becomes insignificantly positive for small traders (0.2803, Z-statistic = 0.13, two-tailed $p > 0.10$). The difference in *ABSRCHG* across large and small traders remains statistically significant (χ^2-statistic = 27.02, two-tailed $p < 0.01$).

[16] We re-estimate Equation (2) using rank regression techniques to address potential estimation issues related to skewness, nonlinearity, and extreme observations. Our conclusions are unchanged.

Investor Trading in Response to Analyst Recommendations Conditional on Credibility

Our findings in Table 2 support the SEC's concern that small investors might be less able than large traders to discern the significance of revisions in analyst stock recommendations because small investors: (1) trade more surrounding revisions, in general; and (2) trade less in response to the magnitude of the revision, our proxy for the arguments contained in the report in support of the recommendation. We probe these issues further by examining how the credibility of the recommendation, as captured by the change in or the level of the recommendation, differentially affects large and small investors' trading behavior. In particular, we investigate whether small investors trade more than large traders, on average, for upgrades/buys and rely less on the arguments in support of the recommendation than large traders for upgrades/buys. Results consistent with each of these hypotheses would suggest that small traders do not understand how analysts' incentives to issue upgrades or buys affect the credibility of the recommendation and may indicate that small investors are more easily misled than large investors.

We choose the direction of the change in (i.e., upgrade) and level of (i.e., buy) the revised recommendation as our primary proxies for analyst credibility, *LOWCRED*, for the following reasons. First, the change in and level of an analyst's recommendation are salient features of the analyst's report, increasing the power of our tests to detect differences in trading behavior between large and small investors. Second, prior work has documented that the market reaction to upgrades and buys is less pronounced than the market reaction to downgrades and sells (see, e.g., Asquith et al. 2005; Hirst et al. 1995; Jegadeesh et al. 2004; Mikhail et al. 2004; Womack 1996), suggesting upgrades and buy recommendations are less credible.[17] Third, Mayew (2006) finds that the probability that an analyst participates during management/analyst conference calls is increasing in his view of the firm, consistent with analysts facing incentives to issue favorable recommendations to enhance access to management (see also Francis and Philbrick 1993). Such access can favorably affect relative forecast accuracy, which may improve analyst job prospects (Mikhail et al. 1999).

Related, given that analysts can generate higher trading commissions for their respective brokerages through positive recommendations (Irvine 2004) and brokerages whose analysts issue negative recommendations on potential or current clients may be excluded from lucrative advisory and underwriting engagements as retribution (see, e.g., Siconolfi 1995; Solomon and Frank 2003), investment banks have adopted compensation plans that explicitly reward security analysts more for issuing buys than sells, regardless of their profitability, and link an analyst's salary and bonus to quantifiable measures such as his firm's underwriting fees (see, e.g., Dorfman 1991; Dugar and Nathan 1995; Lin and McNichols 1998). Consistent with such incentives stemming from access to management and performance evaluation, the incidence of analysts issuing sells is rare; typically around 5 percent of all recommendations are sells (Barber et al. 2001; Mikhail et al. 2004; Opdyke 2002; Santoli 2001).[18]

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[17] Consistent with upgrades being less lucrative than downgrades, Womack (1996) finds that size-adjusted returns to upgrades are insignificant in the six-month period after the revision while size-adjusted returns to downgrades are significantly negative, averaging −9.15 percent (see also Jegadeesh et al. 2004).

[18] If brokerages' primary concern were maximizing the returns that investors generate following stock recommendations, then we would expect compensation plans that reward downgrades more than upgrades. Asquith et al. (2005) report that the average five-day return to downgrades is −6.6 percent, while the average return to upgrades is 4.5 percent.

We modify Equation (2) to include an indicator variable, *LOWCRED*, to represent recommendation credibility as represented by either the change in or level of the revised recommendation. We estimate the following model separately for each trader type:

$$\begin{aligned} AVOLUME^{j}_{i,k,t} = {} & \beta^{j}_{0} + \beta^{j}_{1}LOWCRED_{i,k,t} + \beta^{j}_{2}ABSRCHG_{i,k,t} \\ & + \beta^{j}_{3}ABSRCHG_{i,k,t}{*}LOWCRED_{i,k,t} + \beta^{j}_{4}FIRM\_SIZE_{i,t-1} \\ & + \beta^{j}_{5}ABSRCHG_{i,k,t}{*}FIRM\_SIZE_{i,t-1} + \beta^{j}_{6}BROK\_SIZE_{k,t-1} \\ & + \beta^{j}_{7}ABSRCHG_{i,k,t}{*}BROK\_SIZE_{k,t-1} + \beta^{j}_{8}PRIOR\_PERF_{k,t} \\ & + \beta^{j}_{9}ABSRCHG_{i,k,t}{*}PRIOR\_PERF_{k,t} + \beta^{j}_{10}AMKTVOL_{t-1} \\ & + \beta^{j}_{11}ABSRCHG_{i,k,t}{*}AMKTVOL_{t-1} + \xi^{j}_{i,k,t} \end{aligned} \tag{3}$$

where the variables not previously defined are:

$LOWCRED_{i,k,t}$ = an indicator variable taking the value of 1 if analyst *k* upgrades his recommendation for firm *i* at time *t*, 0 otherwise (*LOWCRED* = *UPGRADE*), or 1 if analyst *k* revises his recommendation to a buy/strong buy for firm *i* at time *t*, 0 otherwise (*LOWCRED* = *BUY*); and
$\xi^{j}_{i,k,t}$ = error term.

Given the inclusion of *LOWCRED*, the estimated intercept in Equation (3) captures the average level of abnormal volume in response to a recommendation downgrade (when *LOWCRED* = *UPGRADE*) or a hold/sell recommendation (when *LOWCRED* = *BUY*) after controlling for other factors correlated with volume. The estimated intercept plus the estimated coefficient on *LOWCRED* provides the level of abnormal volume in response to recommendation upgrades (when *LOWCRED* = *UPGRADE*) or buys (when *LOWCRED* = *BUY*).

Our predictions regarding Equation (3) examine differences in trading responses to upgrades/buys for large and small investors. We focus on differential responses to upgrades/buys assuming: (1) upgrades/buys are less credible then downgrades/sells and (2) large traders are more sophisticated investors. Thus, within a trader type, we predict the estimated coefficient on *LOWCRED* will be positive (negative) for small (large) traders.

Furthermore, comparing across trader types, we expect that large traders' abnormal trading volume will be less than small traders' for upgrades and buys. Therefore, we predict that the estimated coefficient on the intercept plus *LOWCRED* for large traders will be less than that sum for small traders. Similarly, *ABSRCHG* plus *ABSRCHG*LOWCRED* captures the level of abnormal volume in response to recommendation upgrades (when *LOWCRED* = *UPGRADE*) or buys (when *LOWCRED* = *BUY*) conditional on the supporting arguments contained in the analyst's report. If large traders trade more than small investors in response to the arguments present in an analyst's report accompanying an upgrade or buy, then we expect that the estimated coefficient on *ABSRCHG* plus *ABSRCHG*LOWCRED* for large traders will be greater than that sum for small traders. This finding would be consistent with large investors relying more on the rationale contained in an analyst's report in the presence of a less credible recommendation.

Table 3 provides the results from estimating Equation (3). The results of the within trader type comparison indicate that the coefficient estimate on *UPGRADE* is statistically positive (insignificant) for small (large) traders. Thus, unlike large traders, small traders'

TABLE 3
Abnormal Trading Volume in Response to Recommendations Conditional on Report Credibility

	LOWCRED = UPGRADE		*LOWCRED = BUY*	
Variable	**Large**	**Small**	**Large**	**Small**
Intercept	74.3681*** (4.55)	101.2065*** (6.84)	54.9194*** (3.34)	79.0414*** (5.26)
LOWCRED	4.8994 (0.82)	11.2447** (2.14)	50.4519*** (7.76)	53.4825*** (9.10)
ABSRCHG	70.0503*** (6.01)	51.3204*** (5.02)	76.9368*** (6.59)	59.4955*** (5.79)
*ABSRCHG*LOWCRED*	−21.4416*** (−5.15)	−20.2869*** (−5.52)	−37.1296*** (−8.37)	−34.0076*** (−8.50)
FIRM_SIZE	1.1205 (0.56)	−3.1981* (−1.78)	0.4078 (0.21)	−3.7490** (−2.10)
*ABSRCHG*FIRM_SIZE*	−8.2017*** (−5.96)	−5.7286*** (−4.78)	−8.0189*** (−5.84)	−5.6159*** (−4.68)
BROK_SIZE	0.2045** (2.44)	0.2060*** (2.75)	0.2113** (2.53)	0.2202*** (2.96)
*ABSRCHG*BROK_SIZE*	0.3120*** (4.62)	0.2410*** (4.07)	0.3094*** (4.58)	0.2353*** (3.99)
PRIOR_PERF	13.9566*** (5.19)	16.7811*** (6.69)	13.0720*** (4.86)	15.9842*** (6.37)
*ABSRCHG*PRIOR_PERF*	−5.3737*** (−2.92)	−7.5730*** (−4.51)	−4.8630*** (−2.64)	−7.1240*** (−4.25)
AMKTVOL	1.9604*** (5.56)	2.1917*** (6.98)	1.9081*** (5.44)	2.1797*** (6.96)
*ABSRCHG*AMKTVOL*	−0.1989 (−0.78)	−0.2700 (−1.20)	−0.1780 (−0.70)	−0.2684 (−1.20)
R^2	2.69%*** (73.71)	2.93%*** (85.46)	2.55%*** (73.11)	2.92%*** (87.41)
$\chi^2(1)$: Intercept	4.75**		3.73*	
$\chi^2(1)$: Intercept + *LOWCRED*	7.12***		4.88**	
$\chi^2(1)$: *ABSRCHG*	4.84**		4.16**	
$\chi^2(1)$: *ABSRCHG* + *ABSRCHG*LOWCRED*	4.23**		2.80*	

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*, **, *** Statistically different from zero at two-tailed $p < 0.10$, 0.05, and 0.01, respectively.
This table provides the results from estimating Equation (3) using seemingly unrelated regression techniques.
The dependent variable is the abnormal volume for large or small traders over ($t = -2, +2$) ($t = 0$ is the date of the recommendation revision). For each variable in Equation (3), the estimated coefficient is presented.
The Z-statistic is provided in parentheses below the estimated coefficient; the Z-statistics are computed using the Huber-White estimator.
The F-statistic is provided in parentheses below the R^2.
The χ^2 statistic tests whether the specified coefficients are equal across the large and small investor estimations.
Variables are defined in the notes to Tables 1 and 2.

average response to upgrades is greater than their average response to downgrades, suggesting they do not fully understand analysts' incentives to issue upgrades.[19]

Comparing across trader types, we find that small investors trade more, on average, for upgrades than large investors; the sum of the intercept plus *UPGRADE* is statistically greater for small traders (101.2065 + 11.2447 = 112.4512) than for large traders (74.3681 + 4.8994 = 79.2675; $\chi^2 = 7.12$, two-tailed $p < 0.01$). We find that the intercept for small traders (101.2065) is significantly greater than that for large traders (74.3681, $\chi^2 = 4.75$, two-tailed $p < 0.01$).[20] Results for *LOWCRED* = *BUY* (columns 4 and 5 of Table 3) yield similar inferences except that the coefficient estimate on *BUY* is statistically positive for both small and large traders.

The statistically positive coefficient estimate on *BUY* for large traders appears counter to our results for *UPGRADE*. Our sample, however, contains 15,880 buy recommendations, of which 8,806 are downgrades from strong buy to buy, while 7,704 are upgrades from hold or sell to strong buy or buy. Untabulated analyses are consistent with the observed positive coefficient on *BUY* for large traders resulting from large traders increasing trading in response to buy recommendations that are bad news.[21] We continue to find that small trader response to buys is greater than that for large traders (Intercept + *BUY* for small traders > Intercept + *BUY* for large traders, $\chi^2 = 4.88$, two-tailed $p < 0.05$).

Consistent with our expectation, the response to the information conveyed by an upgrade (*ABSRCHG* + *ABSRCHG*UPGRADE*) is greater for large traders (70.0503 − 21.4416 = 48.6087) than for small traders (51.3204 − 20.2869 = 31.0335; χ^2-statistic = 4.23, two-tailed $p < 0.05$). Thus, large traders consider the arguments supporting an upgrade more than small traders. We also note that the estimated coefficient on *ABSRCHG* is statistically positive and greater for large traders (70.0503) than for small traders (51.3204, χ^2-statistic = 4.84, $p < 0.05$), consistent with large investors trading more in response to the information conveyed by an analyst's downgrade. Results tabulated in columns 4 and 5 when *LOWCRED* = *BUY* yield identical inferences. Thus, although small investors trade more in response to a downgrade or sell recommendation than large investors, large investors trade more in response to the arguments supporting a downgrade or sell recommendation. These findings are consistent with more sophisticated information processing on the part of large traders. The negative estimated coefficient on *ABSRCHG*LOWCRED* in both specifications is consistent with prior research. Asquith et al. (2005) demonstrate that investors, in response to a downgrade, are more likely to focus on the information contained in an analyst's report, such as its rationale, price target changes, and earnings forecast revisions (see also Hirst et al. [1995] for similar results in an experimental setting).

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[19] The significantly positive coefficient on *UPGRADE* for small traders does not appear to be caused by an "attention" effect (see Lee 1992; Barber and Odean 2006). The attention effect postulates that small investors' trading volume is a function of news. Because bad news recommendations generally are associated with more extensive attention (as evidenced by the larger abnormal returns surrounding bad news recommendations relative to good news recommendations), a pure attention effect predicts that small traders' abnormal trading to bad news recommendations would be greater than their abnormal trading to good news recommendations (e.g., a negative coefficient on *LOWCRED*).

[20] In Section IV, we document that this finding is inconsistent with small traders selling more than large traders in response to more credible downgrades; rather, small traders are net buyers following both upgrades and downgrades.

[21] To investigate this possibility, we re-estimate Equation (2), modified to include the indicator variable *UPGRADE*, using only the subsample of buy recommendations. In this analysis, the estimated coefficient on *UPGRADE* for large traders is −14.0356 ($t = -4.07$, two-tailed $p < 0.01$), supporting our conjecture that the positive coefficient on *BUY* in Table 3 for large traders is attributable to bad news revisions.

Investor Trading in Response to Analyst Recommendations Conditional on Cross-Sectional Variation in Credibility

We examine whether large and small traders' responses vary cross-sectionally with factors that increase or decrease the credibility of upgrades and buy recommendations. We consider two factors, brokerage house size and analyst affiliation.

Brokerage House Size

The likelihood of the brokerage house engaging in investment banking business increases with size. *Ceteris paribus*, upgrades and buys from the smallest brokerage houses should be viewed as more credible because analysts at smaller brokerages do not face investment-banking incentives to issue overly optimistic recommendations. Prior work, however, has used brokerage house size as a proxy for the availability of resources (e.g., Clement 1999), suggesting that *ceteris paribus*, upgrades and buy recommendations from the largest brokerage houses should be viewed as more credible because they are based on more information.

The finding in prior research that analysts employed by the largest brokerage houses issue more accurate earnings forecasts and more profitable stock recommendations (e.g., Clement 1999; Mikhail et al. 2004) suggests that for large brokerage houses, the effect of greater resources dominates the potential incentive conflicts arising from investment banking. Thus, we assume that upgrades or buys issued by analysts at the largest and smallest brokerage houses are more credible than those issued by analysts at medium-sized brokerage houses. Because we are not able to explicitly test which brokerage houses are more credible *ex ante*, our conclusions should be interpreted in light of our assumptions.

To investigate the cross-sectional variation in the response to upgrades and buys conditional on brokerage house size, we construct two indicator variables, *LGBROK* and *SMBROK*. *LGBROK* (*SMBROK*) is an indicator variable that equals 1 if the analyst is employed by a brokerage house in the top (bottom) third of the distribution of brokerage house size. We modify Equation (3) to include *LOWCRED*LGBROK* and *LOWCRED*SMBROK*. If large investors condition their trading on the credibility of the analyst's recommendation, then we expect *LOWCRED* (*LOWCRED*LGBROK* and *LOWCRED*SMBROK*) to be statistically negative (statistically positive) when *LOWCRED* = *UPGRADE* or *LOWCRED* = *BUY*. Such results would be consistent with large investors trading less (more) in response to the less (more) credible recommendations from medium (small and large) brokerages.

In the large trader regression, regardless of whether *LOWCRED* = *UPGRADE* or *LOWCRED* = *BUY*, the estimated coefficient on *LOWCRED* is significantly negative, consistent with large traders reacting less to upgrades from medium-sized brokerage houses (results not tabulated). Furthermore, we find that the estimated coefficients on *LOWCRED*LGBROK* and *LOWCRED*SMBROK* are significantly positive, indicating that large investors react more strongly to upgrades from large and small brokerage houses. By contrast, in the small trader regression, regardless of whether *LOWCRED* = *UPGRADE* or *LOWCRED* = *BUY* the estimated coefficient on *LOWCRED* is significantly positive, while the estimated coefficients on *LOWCRED*LGBROK* and *LOWCRED*SMBROK* are insignificant. These results are consistent with small investors reacting more strongly to upgrades in general, and not conditioning this differential response on the size of the brokerage house. Based on our assumption that upgrade and buy recommendations issued by the largest and smallest brokerage houses are more credible than those issued by medium-sized brokerage houses, we interpret our findings as suggesting that large traders incorporate the effect of brokerage house size on the credibility of upgrades and buy recommendations, while small traders do not.

Analyst Affiliation

Affiliated analysts, those employed by the covered firm's underwriter, face more extreme consequences from issuing negative recommendations, including the potential loss of existing corporate banking business. Therefore, we assume that upgrades or buys (downgrades or sells) issued by unaffiliated analysts are more (less) credible than those issued by analysts whose employer has a banking relationship with the company covered.[22]

To investigate cross-sectional variation in the response to upgrades and buys conditional on affiliation, we collect data on equity and debt underwriting and the identity of the lead and co-underwriters of these offerings from Securities Data Corporation (SDC). Following prior research, we define analysts as affiliated ($AFFIL = 1$) if employed by a brokerage house that served as a lead or co-underwriter within one year before the date for which the recommendation is revised. Based on this definition, 1,123 of the 50,076 sample recommendation revisions correspond to affiliated analysts. We modify Equation (3) to include *LOWCRED*AFFIL*. If large investors condition their trading on the credibility of the analyst's recommendation, then we expect *LOWCRED* (*LOWCRED*AFFIL*) to be statistically negative (statistically positive). These findings would be consistent with large investors trading less (more) in response to the less (more) credible recommendations from affiliated (unaffiliated) analysts.

In the large trader regression, the estimated coefficient on *UPGRADE* (*BUY*) is significantly negative (insignificant), while the coefficients on *UPGRADE*AFFIL* and *BUY*AFFIL* are insignificant. These findings suggest that large traders discount upgrades (do not react more strongly to buy recommendations), regardless of the affiliation status of the analyst. For small traders, the estimated coefficient on *LOWCRED* is significantly positive; the estimated coefficient on *LOWCRED*AFFIL* is insignificant for both *UPGRADE* and *BUY*. These findings suggest that small investors react more strongly to upgrades and buys, regardless of the affiliation status of the analyst. While these findings are consistent with those in Table 3, they do not indicate that either trader type conditions his perceived credibility of the recommendation on the affiliation status of the analyst. One potential explanation for these findings is the small sample of affiliated analysts, possibly weakening the statistical power of our tests.

Overall, the findings in Table 3 indicate that, consistent with a failure to fully account for analyst incentives, small investors trade more, on average, than large investors in response to recommendation upgrades and buys. Furthermore, small traders do not condition their response as much as large traders to the content of the upgrade or buy. These findings are consistent with large investors being more sophisticated processors of information, and provide support for regulators' concerns that analysts may more easily mislead small investors with favorable recommendations.[23] This conclusion assumes that the direction of trade (buy versus sell) is consistent with the information being released; specifically, it assumes that large investors are more likely to sell after downgrades or sell recommendations relative to small investors and less likely to purchase following upgrades or buy recommendations. The dependent variable in Equation (3), abnormal trading volume, does not measure trade direction. We examine trade direction and excess returns earned by each investor group next.

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[22] Malmendier and Shanthikumar (2007) and Michaely and Womack (1999) find that following affiliated recommendations leads to lower returns (approximately 13 percent to 15 percent a year) than following unaffiliated analysts, consistent with affiliated analysts facing incentives to issue more favorable reports.

[23] We re-estimate Equation (3) using rank regression techniques; our results are unchanged.

Investor Trade Direction and Returns Earned in Response to Analyst Recommendations

To examine whether large and small investors are more likely to buy or sell following certain types of recommendation revisions, we use the algorithm developed by Lee and Ready (1991) to classify each trade as buyer- or seller-initiated. This algorithm compares the price at which the trade occurs to the bid and ask; trades occurring at or closer to the quoted ask (bid) are classified as buys (sells). Using Equation (1), we calculate abnormal buy and sell volume metrics for each trader type, and define *NETBUY* as abnormal buying less abnormal selling. Positive (negative) values of *NETBUY* indicate that the volume of abnormal purchases is greater (less) than the volume of abnormal selling. We find that the mean value of *NETBUY* is positive and statistically different from zero at two-tailed $p < 0.01$ for small traders regardless of the change in (upgrade versus downgrade) or the level of (buy versus hold/sell) the recommendation (results not tabulated). Therefore, regardless of the type of news implied by the recommendation, small traders tend to purchase stocks following recommendation revisions. In contrast, the mean value for *NETBUY* for large traders is significantly negative at two-tailed $p < 0.01$ for downgrades and hold/sell recommendations, significantly positive for upgrades, and insignificantly different from zero for buy recommendations. Furthermore, the average value of *NETBUY* for upgrades or buy recommendations is significantly greater for small traders than for large traders at two-tailed $p < 0.01$, suggesting that large traders' purchases are more tempered following good news recommendations relative to small investors. These results are consistent with Lee (1992) who finds that small traders buy following good *and* bad news earnings announcements, while large traders buy (sell) following good (bad) earnings news (see also Barber and Odean 2006). These findings also support our conclusions that large traders are more sophisticated processors of the information released by security analysts and better understand the effect of analyst incentives on report credibility.

Ultimately, however, regulators' interest in analyst recommendations stems from the belief that small investors are misled into making suboptimal investment decisions. To address this concern, we examine if raw returns accruing to investors responding to recommendation revisions differ between small and large traders. We follow Asthana et al. (2004) to determine the total raw returns earned for each trader type.[24] Specifically, we multiply the daily amount of net abnormal volume (abnormal buying volume less abnormal selling volume, based on dollar value of shares traded) deflated by the absolute value of total abnormal trading volume (abnormal buying volume plus abnormal selling volume) for each investor group during our event window by the firm's raw return over the subsequent five trading days.[25] To minimize the effect of outliers, we eliminate observations in the top and bottom percentile of the distribution; our conclusions hold if these observations are retained.

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[24] Our results are unaffected using abnormal returns.

[25] For example, the net abnormal buying in a firm's stock on day -2 is multiplied by that firm's return over days -1 to $+3$, while the net abnormal buying in a firm's stock on day $+2$ is multiplied by that firm's return over days $+3$ to $+7$. Asthana et al. (2004) employ a similar approach in determining gains to trading following Form 10-K filings on the SEC's Electronic Data, Gathering, Analysis, and Retrieval (EDGAR) system.

Table 4 summarizes this analysis. Consistent with regulators' concerns, large traders generate statistically significant positive returns in the subsequent five trading days for both good and bad news recommendation revisions, while small traders generate statistically negative returns both overall and following downgrades/sells.[26] Specifically, we find that large (small) traders earn an average of 5.1 percent (−0.9 percent) following strong buys/buys and 5.2 percent (−3.1 percent) following holds/sells. Similarly, large (small) traders earn an average of 5.4 percent (0.4 percent) following upgrades and 4.9 percent (−3.7 percent) following downgrades. All differences are statistically significant at two-tailed $p < 0.01$ (median comparisons yield similar inferences).[27] Thus, despite buying more, on average, than large traders following upgrade and strong buy/buy recommendations, small traders earn less from their trades. This finding is surprising given that returns surrounding these recommendations are, on average, positive. One possibility is that large traders are able to discern which recommendations are associated with more profitable returns while small traders are not. Consistent with this possibility, we find that the correlation between *NETBUY* and the firm's subsequent five-day return is greater for large traders than for small traders.

An important caveat to our conclusions is that our calculations of the returns earned by each trader type may not yield reasonable estimates of the actual returns earned because TAQ data do not enable us to calculate actual trader-level changes in ownership and holding periods. These data limitations reduce our ability to draw strong conclusions from this analysis. Overall, however, these findings are supportive of regulators' concerns that small investors make suboptimal investment decisions (i.e., they earn less than large traders) in responding to analysts' recommendations.

TABLE 4
Mean Percentage Returns Earned in Response to Recommendations Conditional on the Type of the Recommendation

	Trader Type		t-statistic
Subsample	Large	Small	Large versus Small
Overall	5.1301***	−1.8161***	−9.66***
Downgrades	4.8955***	−3.7244***	−11.36***
Upgrades	5.4085***	0.4225	−3.88***
Holds/Sells	5.2304***	−3.1470***	−8.76***
Strong Buys/Buys	5.0598***	−0.8881***	−5.80***

*, **, *** Statistically different from zero at two-tailed $p < 0.10$, 0.05, and 0.01, respectively.
This table provides mean percentage returns earned for large and small investors based on their inferred trading activity (see Lee and Ready 1991). The returns earned are calculated as the net daily abnormal buying activity for each trader type multiplied by the raw return over the subsequent five trading days. The net abnormal buying activity for each day is defined as abnormal buying volume less abnormal selling volume, based on dollar value of shares traded) deflated by the absolute value of total abnormal trading volume (abnormal buying volume plus abnormal selling volume). Observations in the top and bottom percentile of the distribution are eliminated.

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[26] If observations in the extreme percentile of the distribution are retained in the analysis, then we find that small traders also generate statistically negative returns following upgrades/buys. Other results for small traders and our results for large traders are unchanged.

[27] These findings are generally consistent with the inferences from Malmendier and Shanthikumar (2007), who conclude that small traders earn negative returns from hold/sell recommendations, but not from buy/strong buy recommendations.

Investor Trading in Response to Analyst Recommendations and Earnings Forecasts

In the preceding analyses, we limit our focus to the stock recommendations contained in analysts' reports. For a subset of our sample, the recommendation revision is accompanied by an annual earnings forecast. In this section, we examine how large and small traders react to these two key pieces of information in analysts' reports.

Using the Zacks database, we gather the annual earnings forecast that the analyst issues for the firm on the same day he issues his recommendation. We require a prior annual earnings forecast issued by that analyst for that firm in order to calculate the earnings forecast revision. For 21,613 observations in our sample, the analyst issues a recommendation revision and an annual earnings forecast revision for the firm on the same day.[28] We define the absolute value of the analyst's earnings forecast revision (*ABSFCREV*) as the analyst's current annual earnings forecast minus the analyst's prior annual earnings forecast, deflated by share price ten trading days before the release of the revised forecast. We require that the prior forecast be issued no more than 365 calendar days before the current forecast. We eliminate observations for which the share price is less than \$10 to minimize the small denominator problem. In this subsample, the mean (median) value of *ABSFCREV* is 0.0062 (0.0023, results not tabulated).

We examine investors' trading responses to analyst recommendation revisions and earnings forecast revisions, controlling for other factors correlated with trading volume, by estimating the following regression separately for large and small traders:

$$
\begin{aligned}
AVOLUME^{j}_{i,k,t} = {} & \lambda^{j}_{0} + \lambda^{j}_{1}ABSRCHG_{i,k,t} + \lambda^{j}_{2}ABSFCREV_{i,k,t} \\
& + \lambda^{j}_{3}FIRM\_SIZE_{i,t-1} + \lambda^{j}_{4}ABSRCHG_{i,k,t}{*}FIRM\_SIZE_{i,t-1} \\
& + \lambda^{j}_{5}ABSFCREV_{i,k,t}{*}FIRM\_SIZE_{i,t-1} + \lambda^{j}_{6}BROK\_SIZE_{k,t-1} \\
& + \lambda^{j}_{7}ABSRCHG_{i,k,t}{*}BROK\_SIZE_{k,t-1} \\
& + \lambda^{j}_{8}ABSFCREV_{i,k,t}{*}BROK\_SIZE_{k,t-1} + \lambda^{j}_{9}PRIOR\_PERF_{k,t} \\
& + \lambda^{j}_{10}ABSRCHG_{i,k,t}{*}PRIOR\_PERF_{k,t} \\
& + \lambda^{j}_{11}ABSFCREV_{i,k,t}{*}PRIOR\_PERF_{k,t} + \lambda^{j}_{12}AMKTVOL_{t-1} \\
& + \lambda^{j}_{13}ABSRCHG_{i,k,t}{*}AMKTVOL_{t-1} \\
& + \lambda^{j}_{14}ABSFCREV_{i,k,t}{*}AMKTVOL_{t-1} + \Psi^{j}_{i,k,t} \qquad (4)
\end{aligned}
$$

where the variables not previously defined are:

$ABSFCREV_{i,k,t}$ = the absolute value of analyst *k*'s annual earnings forecast revision for firm *i* at time *t*, calculated as the current earnings forecast minus the previous earnings forecast, deflated by share price ten trading days before the release of the revised forecast; and
$\Psi^{j}_{i,k,t}$ = error term.

Table 5 provides the results from estimating Equation (4). Consistent with large and small investors increasing their trading in response to analyst recommendation and earnings

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[28] There are 24,070 observations for which the analyst issues an annual earnings forecast revision within two days of the recommendation revision; the results provided in Table 5 are unchanged using this sample.

TABLE 5
Abnormal Trading Volume in Response to Recommendation and Earnings Forecast Revisions

	Trader Type	
Variable	**Large**	**Small**
Intercept	43.1072*	73.4017***
	(1.70)	(3.41)
ABSRCHG	57.1019***	33.4387**
	(3.26)	(2.20)
ABSFCREV	1696.3633*	−106.8334
	(1.87)	(−0.14)
FIRM_SIZE	1.8832	−1.6425
	(0.62)	(−0.64)
*ABSRCHG*FIRM_SIZE*	−5.8977***	−3.2252*
	(−2.90)	(−1.82)
*ABSFCREV*FIRM_SIZE*	−172.7126	−8.6984
	(−1.44)	(−0.09)
BROK_SIZE	0.0603	0.0700
	(0.50)	(0.66)
*ABSRCHG*BROK_SIZE*	0.3042***	0.2434***
	(3.31)	(2.96)
*ABSFCREV*BROK_SIZE*	−4.4975	−1.2777
	(−1.22)	(−0.43)
PRIOR_PERF	22.1327***	20.0303***
	(5.71)	(6.13)
*ABSRCHG*PRIOR_PERF*	−10.1143***	−10.0045***
	(−3.83)	(−4.45)
*ABSFCREV*PRIOR_PERF*	473.1459***	381.4317***
	(3.49)	(4.00)
AMKTVOL	1.2067**	1.2945***
	(2.41)	(3.07)
*ABSRCHG*AMKTVOL*	0.2641	0.2709
	(0.72)	(0.85)
*ABSFCREV*AMKTVOL*	9.9733	−13.3102
	(0.53)	(−1.06)
R^2	2.91%***	2.87%***
	(21.91)	(23.69)
$\chi^2(1)$: Intercept	3.23*	
$\chi^2(1)$: *ABSRCHG*	4.21**	
$\chi^2(1)$: *ABSFCREV*	13.30***	

*, **, *** Statistically different from zero at two-tailed $p < 0.10$, 0.05, and 0.01, respectively.

This table provides the results from estimating Equation (4) using seemingly unrelated regression techniques.

The dependent variable is the abnormal volume for large or small traders over ($t = -2, +2$) ($t = 0$ is the date of the recommendation revision).

For each variable in Equation (4), the estimated coefficient is presented.

The Z-statistic is provided in parentheses below the estimated coefficient; the Z-statistics are computed using the Huber-White estimator.

The F-statistic is provided in parentheses below the R^2.

The χ^2 statistic tests whether the specified coefficients are equal across the large and small investor estimations.

ABSFCREV is the absolute value of the analyst's earnings forecast revision, defined as the analyst's current annual earnings forecast less the analyst's prior annual earnings forecast, deflated by share price ten trading days before the release of the revised forecast.

Remaining variables are defined in the notes to Tables 1 and 2.

forecast revisions, the estimated intercept is statistically positive for each investor type (two-tailed $p < 0.10$ in both cases). Consistent with the findings in Table 2, the average small abnormal trading volume is almost twice as great as the average large trader abnormal trading volume (χ^2-statistic = 3.23, two-tailed $p < 0.08$). Thus, small investors trade more, on average, than large traders do in response to the occurrence of recommendation and earnings forecast revisions in the same report.

As in Table 2, we find a statistically positive coefficient estimate associated with *ABSRCHG* for each investor class (two-tailed $p < 0.05$), consistent with more trading volume in response to larger revisions in analysts' expectations of firm performance. For a given one-step increase or decrease in the assigned rating category, small (large) investor abnormal trading volume increases at the margin by 33.4 percent (57.1 percent). The observed difference in *ABSRCHG* across large and small traders is statistically significant (χ^2-statistic = 4.21, two-tailed $p < 0.05$).

We find no evidence that small investors respond to the information contained in the earnings forecast revision; the estimated coefficient associated with *ABSFCREV* for small traders is insignificantly different from zero (two tailed $p > 0.10$). By contrast, and consistent with our expectations, the estimated coefficient associated with *ABSFCREV* is statistically positive for large traders (two-tailed $p < 0.06$) and statistically greater than the estimated coefficient for small traders (χ^2-statistic = 13.30, two-tailed $p < 0.01$). Thus, in responding to analyst recommendations, large traders consider the information contained in the earnings forecast revision accompanying the recommendation change. These findings are consistent with Malmendier and Shanthikumar (2006), who document that recommendations have the most impact on the trading behavior of small traders, while analyst earnings forecasts affect the trading behavior of large traders.

Overall, these findings reinforce those in Table 2, and further indicate that small traders do not consider the information contained in the annual earnings forecast revision in responding to analyst recommendations. That small traders react to the magnitude of the recommendation revision but not to the magnitude of the earnings forecast revision accompanying it suggests that, while they are able to incorporate the information in a coarse and easily interpreted signal (the recommendation revision), they appear unable or uninterested in extracting the information in the more complex signal, the earnings forecast revision, in assessing the firm's future stock price performance.

V. CONCLUSION

Using trade size as a proxy to separate institutional from individual trading behavior, we investigate small and large investors' trading responses to analysts' reports. We find that both trader types respond to recommendation revisions. Our results suggest, however, that large traders consider the arguments contained in the analyst's report more than small traders, as captured by the magnitude of the recommendation revision and the magnitude of the earnings forecast revision (when present). By contrast, small traders tend to react more to the mere occurrence of a recommendation. These findings are consistent with large traders being more sophisticated processors of information.

Furthermore, we investigate whether large and small traders condition their reaction on the effect of analyst incentives on recommendation credibility. We document that small investors trade more, on average, than large investors in response to upgrades and buys. Large investors, however, consider the arguments contained in the analyst report more than small investors, especially in the case of downgrades and sells.

Finally, we document that small traders are net purchasers following recommendation revisions regardless of the type of the recommendation, while large traders tend to be net sellers following downgrades and sells. Consequently, large traders generate statistically significant positive returns for both good and bad news recommendation revisions. In contrast, small traders generate negative returns following downgrades/sells and insignificant returns following upgrades/buys.

Overall, our research provides preliminary evidence supporting regulators' concerns that small investors do not properly consider the effects of analyst incentives on report credibility when reacting to recommendations. Our analyses are based on recommendations issued prior to the passage of Regulation AC, which requires analysts to disclose whether they received compensation or other remuneration in connection with the views expressed in the report. It remains an open question as to whether these disclosures are effective in mitigating small investors' apparently suboptimal investment decisions.

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Internal Control Weakness and Cost of Equity: Evidence from SOX Section 404 Disclosures

Maria Ogneva
University of Southern California

K. R. Subramanyam
University of Southern California

K. Raghunandan
Florida International University

ABSTRACT: We examine the association between cost of equity and internal control weakness (ICW) for firms that filed first-time Section 404 reports with the SEC. Using several proxies, we find higher implied cost of equity associated with ICW firms than for a control sample of firms that disclosed no ICW. However, the higher cost of equity associated with ICW disappears after controlling for primitive firm characteristics and for analyst forecast bias. Overall, we find that, on average, ICWs are not *directly* associated with higher cost of equity.

I. INTRODUCTION

Section 404 of the Sarbanes-Oxley Act of 2002 (SOX, U.S. House of Representatives 2002) requires that managers maintain adequate internal controls over financial reporting and provide an auditor-attested assessment of their effectiveness in the annual report (10-K filing), highlighting discovered material weaknesses. Section 404 has been extremely controversial. Companies maintain that the high costs of complying with Section 404 are not commensurate with its perceived benefits and, hence, call for modification or repeal of the section (e.g., American Bankers Association [ABA] 2005; Financial Executives Institute [FEI] 2005; Microsoft 2005; Powell 2005). Regulators insist that the internal control requirements of Section 404 should result in higher quality financial reporting, which in turn should lower cost of capital (U.S. House of Representatives 2005; U.S. Senate 2004; Donaldson 2005b). Financial advisors maintain that investors should demand a higher risk premium for firms with internal control weaknesses and credit rating agencies note

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that internal control weakness (hereafter, ICW) is an important consideration in the rating process (Wilfert 2005; Moody's Investor Service 2004; Fitch Ratings 2005). In light of this debate, it is important to investigate whether ICW is indeed associated with higher cost of capital. Accordingly, our paper uses a large sample of Section 404 disclosures to examine whether reported ICWs are associated with higher implied cost of equity.

ICW can pertain to specific accounting issues (such as revenue recognition or inventory accounting) or broader control issues (such as adequacy and training of personnel or "tone at the top"). Accordingly, there are at least two reasons to expect higher cost of equity for ICW firms. First, ICWs can result in poor accounting quality, thereby increasing information risk. Information risk has been both theoretically (e.g., Easley and O'Hara 2004; Lambert et al. 2007) and empirically (Francis et al. 2004, 2005) linked to higher cost of equity. Second, ICW may be symptomatic of poor management controls in general, which could increase business risk and the cost of equity to the extent this risk is systematic.

We study 2,515 firms that filed first-time Section 404 reports with the SEC during the period from November 2004 to January 2006. Of the 2,515 firms, 346 filed adverse opinions (i.e., acknowledged one or more ICWs) and 2,169 filed clean reports. Our primary tests use implied cost of equity, which we estimate by inverting the relation between stock prices and analysts' earnings forecasts. Because of error in measuring implied cost of equity, we estimate several alternative proxies that use different underlying models and assumptions, as well as different data. To control for macroeconomic effects, we employ a pure cross-sectional design by estimating cost of equity as of June 2004 for all our sample firms. We also replicate our analyses as of June 2006 to incorporate announcement effects, if any, of our sample firms' Section 404 disclosures on our cost-of-equity estimates. In univariate analysis, we find that most of our implied cost-of-equity proxies are, on average, significantly higher for ICW firms than for control firms (i.e., those that file clean reports), during both June 2004 and June 2006.

Ge and McVay (2005), Ashbaugh-Skaife et al. (2007), and Doyle et al. (2007a) find that firms reporting ICW (both under Section 404 and under the related Section 302) are relatively more distressed and have lower market values, greater complexity of operations, higher incidence of organizational change (such as M&A and restructuring activity), and greater accounting measurement risk. Therefore, it is possible that the higher cost of equity associated with ICW may be attributable to these primitive firm characteristics rather than to ICW per se. Additionally, we find that analysts' forecasts are more optimistic for ICW firms than for control firms, which could generate a relatively stronger upward bias in the cost-of-equity estimates for ICW firms. Accordingly, we examine differences across ICW and control firms after controlling for these factors. For both June 2004 and June 2006, we find no significant differences between ICW and control firms for most of our cost-of-equity proxies after controlling for primitive firm characteristics and analyst forecast bias (with the exception of the Value Line expected return proxy). These results lead us to conclude that ICWs do not appear to be *directly* associated with cost of equity.

An important alternative explanation for our results is that extreme measurement error in our implied cost-of-equity proxies (Easton and Monahan 2005; Guay et al. 2005) significantly reduces the power of our tests to detect a difference between ICW and control firms.[1] Accordingly, we conduct the following additional analyses. First, we replicate Easton and Monahan's (2005) construct validity tests for our cost-of-equity proxies during our sample period. Consistent with Easton and Monahan (2005), we find that most of our proxies fail these construct validity tests. However, the proxy proposed by Claus and Thomas (2001)—which also suggests no difference between ICW and control firms—performs well in these tests; specifically, its association with future expected returns is not statistically different from that predicted by theory and its measurement error is insignificant. Second, we examine patterns in various underlying drivers of cost of equity (risk attributes) that theory suggests may be associated with ICW, including earnings quality proxies, information asymmetry proxies, and market risk attributes. In general, we find no difference between ICW and control firms for these risk attributes after controlling for primitive firm characteristics. Overall, these additional tests increase the confidence that our primary inferences are not driven by measurement error in the implied cost-of-equity proxies.

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[1] There are two arguments against the low power explanation. First, we do find a difference between ICW and control firms in implied cost of equity. These differences vanish only after controlling for firm characteristics and analyst forecast bias. Therefore, it is more likely that our "non-result" arises from correlated omitted variable bias rather than low power. Second, we conduct additional analyses that suggest that our tests are powerful enough to detect even reasonably small differences in cost of equity, such as a difference of 50 basis points.

Our study contributes to the intense debate regarding costs and benefits of the Section 404 provisions of SOX. Our evidence suggests that cost of equity, on average, is unlikely directly associated with ICW reported under Section 404. One inference that could be drawn from this finding is that there are potentially no significant cost-of-equity benefits associated with maintaining and reporting on effective internal controls for financial reporting. Since reduced cost of capital was claimed as a major benefit of the Section 404 requirements, our results have important implications for this regulatory debate by questioning the cost-benefit trade-offs of this regulation.

Such a strong inference must be tempered in light of conflicting evidence from other concurrent studies. Using Value Line's expected rates of return as a proxy for cost of equity, Ashbaugh-Skaife et al. (2006) find that ICWs (reported under both Section 302 and Section 404) are associated with higher cost of equity, even after controlling for firm characteristics, and that subsequent remediation of these weaknesses results in lowered cost of equity. Our Value Line results are consistent with those of Ashbaugh-Skaife et al. (2006); however, we find that these results are driven by sampling biases arising from Value Line's restricted coverage.[2] Also, using a short-window design Beneish et al. (2006) document a negative stock price reaction to ICW disclosures (under both Section 302 and Section 404), which they attribute to lowered earnings' expectations and increased cost of equity.[3] However, consistent with our results, Beneish et al. (2006) document no significant stock price or cost-of-equity effects associated with Section 404 disclosures. The lack of a significant association between cost of equity and Section 404 disclosures may be attributed to (1) the lower materiality thresholds employed by auditors when disclosing Section 404 material weaknesses (Doyle et al. 2007b); and/or (2) the superior information environments of the larger firms that are subject to the accelerated filing requirement of this section. Therefore, it is possible that ICW could have cost-of-equity implications that are not detectable in our study, which focuses on Section 404 disclosures made by larger firms.

The rest of the paper proceeds as follows. Section II motivates our study and discusses theoretical considerations relating ICW and cost of equity. Section III describes the sample and reports descriptive information. Section IV presents our primary results. Section V presents additional analyses and Section VI concludes.

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[2] The Value Line expected return proxy also performs poorly in Easton and Monahan's (2004) tests of construct validity. This further reduces the reliability of the Value Line results.

[3] Hammersley et al. (2005) also study market reactions to Section 302 reports.

II. MOTIVATION

The Regulatory Debate

While evaluation of internal controls over financial reporting has long been an important element of the auditing process (Kinney et al. 1990; Hermanson 2000), there were no requirements for making public disclosures regarding internal controls in the pre-SOX era, except when an 8-K was filed following an auditor change. Sections 302 and 404 of SOX are the first broad-based statutory requirements relating to public disclosure of internal control effectiveness. In particular, Section 404 of SOX (which became effective for accelerated filers for fiscal years ending on or after November 15, 2004) requires that companies include an auditor-attested report on the effectiveness of their internal controls over financial reporting in their annual 10-K filings that specifically highlights any discovered material weaknesses. In addition, Auditing Standard No. 2 (AS No. 2) issued by the Public Company Accounting Oversight Board (PCAOB) in March 2004 requires the auditor to render an opinion regarding the client's internal controls over financial reporting.

Section 404's requirements with respect to internal controls have arguably been the most controversial provisions of SOX. Much of the controversy surrounding this section relates to the high costs of compliance, which many perceive are not commensurate with the corresponding benefits. For example, 94 percent of respondents to a March 2005 survey by the Financial Executives Institute indicated that the costs of compliance far outweighed the benefits (FEI 2005), and many SEC registrants and business associations have complained about the costs associated with the internal control reporting requirements, calling for the revision (and even repeal) of the requirements (e.g., American Electronics Association [AEA] 2005; FEI 2005). Partly in response to such concerns, both the U.S. Senate and the U.S. House of Representatives have held hearings on the costs associated with the internal control reporting requirements of SOX (U.S. Senate 2004; U.S. House of Representatives 2005).

Regulators and auditors highlight the perceived benefits of Section 404, which largely relate to its effect on cost of capital. For example, SEC Chairman William Donaldson notes that the requirements of SOX, and in particular Section 404, are "important because they have produced, and will produce, improvements that help to restore and reinforce investor confidence in our markets, and lower the cost of capital to issuers" (Donaldson 2005a). Consistent with the above argument, Ernst & Young notes that effective implementation of the internal control reporting requirements of SOX should lead to "potential benefits to investors ... [that] are significant in terms of improvements in the reliability of periodic financial reports" and that as a result "issuers should have a lower cost of capital" (Ernst & Young 2005).[4]

User groups suggest that the internal control assessments under Section 404 will influence their decisions in ways that affect cost of capital. Financial advisors suggest that investors should demand a higher risk premium for companies with ineffective or deficient internal controls, which are associated with a higher probability that accounting problems exist (Wilfert 2005). Also, credit-rating agencies indicate that internal control weaknesses, especially arising from company-wide problems, are an important factor affecting credit-rating decisions (Moody's Investor Service 2004; Fitch Ratings 2005).

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[4] In a similar vein, Deloitte & Touche notes that complying with Section 404 would lead to multiple benefits including "potential for reduced cost of capital due to capital market valuation of a high quality control environment which improves the predictability and reliability of operating results" (Deloitte & Touche 2005). Also, KPMG's brochure lists "increased confidence of the bond markets and reduced cost of capital" as "compelling rewards" of internal control compliance (KPMG 2005).

Also, many companies voluntarily reported information regarding the adequacy of their internal controls in annual reports in the pre-SOX era (see Bronson et al. 2006; McMullen et al. 1996). In general, voluntary disclosures regarding internal controls were more prevalent among larger companies and these disclosures, almost without exception, happened to be "clean," i.e., there were no reports of any internal control deficiencies. This suggests that companies did believe that there were benefits from signaling good internal controls to the markets.

In summary, there is an intense debate about the costs versus benefits of Section 404. On the one hand, preparers object to the excessive costs of compliance. On the other hand, regulators and auditors point to the potential benefits, which largely arise through reduced cost of capital due to improved financial transparency.

Internal Controls and Cost of Equity Capital

Implicit in the arguments of the proponents of Section 404 is the following two-step link. First, effective internal controls are expected to reduce accounting risk, thereby potentially improving accounting quality. Second, improved accounting quality (or reduced accounting risk) is hypothesized to reduce cost-of-equity capital. In this section, we theoretically explore this two-step link between internal controls and cost of equity. We first examine the nature of reported ICWs and how they could increase accounting risk. We then explore the theoretical relation between accounting (information) quality and cost-of-equity capital. Finally, we hypothesize an alternative mechanism by which ICW could be indirectly associated with cost of equity.

Internal controls over financial reporting are designed to assure reliability of accounting information, thereby providing external users with financial statements of potentially higher quality.[5] Reported material weaknesses in internal controls encompass a wide variety of issues. Ge and McVay (2005) find that a majority of ICWs disclosed pursuant to Section 302 of SOX pertain to problems with specific accounts (e.g., inventory, accounts receivables/payables). Other ICWs are broader in scope and can indirectly affect organizational control processes in addition to impairing financial accounting quality. Such deficiencies could pertain to systems or organizational design flaws such as improper segregation of duties or poor information systems security. ICW may also arise from inadequate or poorly trained personnel—Ge and McVay (2005) note that personnel problems are at the root of many of the reported weaknesses. Finally, ICW can arise from the highest levels of the organization, including poor corporate governance structures and the top management's attitude toward internal controls ("tone at the top").

The PCAOB (2004) defines a material weakness in internal controls over financial reporting as one or more deficiencies that "results in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected." ICW can significantly increase the likelihood of misstatement in financial statements for at least three reasons. First, ICW can increase the likelihood of accounting error. For example, inadequately trained staff increases the likelihood of errors in the interpretation and application of GAAP. Second, as Ge and McVay (2005) observe, systemic internal control problems can increase the scope for managing earnings at various levels in the organization. For example, internal control problems related to contractual agreements with customers and the monitoring of such contracts can make it easier for managers to manipulate recognition of revenue. Finally, material ICWs can also increase the propensity for financial fraud. For example, inadequate or improper segregation of duties can create opportunities for employee fraud. Accordingly, ICW increase accounting risk and therefore have the potential to impair accounting quality.

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[5] For example, according to PCAOB Auditing Standard No. 2 (PCAOB 2004), internal control over financial reporting is "a process designed ... to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP."

Theoretical work by Easley and O'Hara (2004) and Lambert et al. (2007) suggests that information risk (risk arising from poor information quality) may have a nondiversifiable component that is priced by the market. Easley and O'Hara argue that information quality represents a unique risk factor arising from information asymmetry. In their model, uninformed investors demand higher expected return for securities with greater information asymmetry to protect themselves from their information disadvantage vis-à-vis informed investors. Poor (public) information quality increases cost of capital because it exacerbates information asymmetry. Lambert et al. (2007) dispute Easley and O'Hara's (2004) claim that information quality represents a unique risk factor, but suggest that information quality can affect cost-of-equity capital both directly and indirectly. The direct effect arises because superior information quality reduces a firm's beta by dampening conditional covariance of the firm's cash flows with the market. The indirect effect occurs because poor information quality can affect the firm's real decisions by increasing agency problems. Recent empirical evidence (Francis et al. 2004) documents an inverse relationship between earnings quality and implied cost of equity, thereby providing support for the theoretical predictions that information quality can affect cost-of-equity capital.

Thus far, we suggest that ICW can lead to higher cost of capital through its potential effect on quality of accounting information. Alternatively, poor internal controls over financial reporting may also be associated with general management control deficiencies, including inadequate controls over business processes and poor corporate governance structures. Such association is expected to be especially strong when internal control weaknesses over financial reporting are caused by systemic problems such as top management's philosophy toward internal controls ("tone at the top"). Poor management controls may lead to excessive risk taking by managers (e.g., investing in highly risky projects), especially during periods of poor performance.[6] Increased risk taking can increase cash flow volatility, which will be priced to the extent it is systematic. Excessive risk taking can also increase the probability of business failure, which may be priced by the stock market (Fama and French 1995).[7] We therefore hypothesize that ICW can be indirectly associated with higher cost of equity because it is symptomatic of generally poor corporate controls and increased business risk.

III. SAMPLE AND DESCRIPTIVE ANALYSIS

Sample Selection

We obtain our initial sample of 3,802 firms that filed first-time Section 404 reports with the SEC between November 2004 and January 2006 from the Audit Analytics database. This sample comprises 573 adverse (i.e., with material internal control weakness) and 3,229 clean reports. Out of this initial sample, 2,821 firms (approximately 74 percent) meet our common data requirements for implied-cost-of-equity estimation as of June 2004: (1) consensus (median) one- and two-year-ahead forecasts of EPS in the I/B/E/S database as of June 2004; (2) share price and number of shares outstanding as of June 2004 in the I/B/E/S database; and (3) book value and dividend payout for 2003 in the Compustat annual database. We lose another 232 firms because of non-availability of data for control variables in our multiple regression models. Finally, we eliminate 74 firms with clean Section 404 reports that had previously reported material weaknesses under Section 302. Accordingly, our final sample for the June 2004 analyses comprises 2,515 firms of which 346 firms (14 percent) have adverse Section 404 reports (ICW firms) and 2,169 firms (86 percent) have clean Section 404 and Section 302 reports (control firms). The exact number of observations in specific tests, however, will be lower and depend on (1) the unique data requirements of the implied-cost-of-equity measure or other variables used in that test and (2) deletion of outliers.

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[6] Managers' propensity toward excessive risk taking has been documented in the strategic management and corporate finance literatures. Several prior studies show that managers exhibit a propensity to engage in excessive risk taking when the firm's performance is lagging compared to some benchmark. For example, Bowman (1982) and Fiegenbaum and Thomas (1988) provide evidence of the higher overall riskiness of those firms that perform worse than their industry peers. Further, studies on mutual fund managers' behavior document that managers tend to "gamble" by increasing the volatility of the managed portfolios in the end of the fiscal year if the fund has been underperforming in the interim quarters (e.g., Brown et al. 1996; Chevalier and Ellison 1997).

[7] Anecdotal evidence (e.g., Enron and WorldCom) is consistent with poor internal controls increasing business risk and leading to bankruptcy.

Factors Associated with Internal Control Weakness

Ge and McVay (2005), Ashbaugh-Skaife et al. (2007), and Doyle et al. (2007a) show that ICW disclosures under Sections 302 and 404 are associated with a number of firm characteristics. In this section, we examine whether the factors identified by these authors explain the incidence of ICW in our Section 404-only sample. Accordingly, we estimate the following cross-sectional logit model (where subscript i denotes firm):

$$\begin{aligned} Prob(WEAK_i) = f\,(&\beta + \beta_1{*}LOG\_SEGMENTS_i + \beta_2{*}FOREIGN_i \\ &+ \beta_3{*}M\&A_i + \beta_4{*}RESTRUCTURE_i + \beta_5{*}SALEGRW_i \\ &+ \beta_6{*}INVENTORY_i + \beta_7{*}LOG\_MKTV_i + \beta_8{*}LOSS_i \\ &+ \beta_9{*}RZSCORE_i + \beta_{10}{*}LOG\_AGE_i) \end{aligned} \tag{1}$$

where:

$WEAK$ = indicator variable that takes a value of 1 if a firm has an ICW, and 0 otherwise;
$LOG\_SEGMENTS$ = logarithm of number of business segments reported in 2004 Compustat segment file for fiscal year 2003;
$FOREIGN$ = indicator variable equal to 1 if the firm has a non-zero foreign currency translation (Compustat data item #150) in fiscal year 2003, and 0 otherwise;
$M\&A$ = indicator variable equal to 1 if a company was involved in mergers or acquisitions over the three years preceding June 2004, and 0 otherwise (the M&A data come from the SDC Platinum database);
$RESTRUCTURE$ = indicator variable equal to 1 if at least one of Compustat annual data items #376, #377, #378, or #379 is not equal to 0 for any fiscal year in 2001–2003, and 0 otherwise;
$SALEGRW$ = indicator variable that is equal to 1 if industry-adjusted growth in sales (Compustat data item #12) falls into the top quintile in fiscal year 2003, and 0 otherwise;
$INVENTORY$ = inventory (Compustat annual data item #3) over total assets (Compustat annual data item #6);

LOG_MKTV = logarithm of market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding in I/B/E/S as of the end of June 2004;
LOSS = indicator variable equal to 1 if earnings before extraordinary items (Compustat data item #18) in 2002 and 2003 sum to less than 0;
RZSCORE = decreasing decile rank of Altman's (1968) Z-Score; we use decreasing ranks so that larger values indicate higher bankruptcy probabilities; and
LOG_AGE = logarithm of number of years the firm exists in the CRSP database.

We include variables from Ge and McVay (2005), Ashbaugh-Skaife et al. (2007), and Doyle et al. (2007a) that are hypothesized to be associated with the discovery of ICW. Since Section 404 disclosures are mandatory, we do not include variables that are associated with companies' propensity to *report* ICW once such a weakness is discovered. The fundamental factors associated with the existence of internal control deficiencies that we explore pertain to: (1) complexity of operations; (2) organizational change; (3) accounting application measurement risk; and (4) resource constraint indicators. We include two complexity measures: number of business segments (*SEGMENTS*) and foreign operations (*FOREIGN*). To identify organizational change, we include indicator variables to represent recent merger or acquisition activity (*M&A*) or restructuring activity (*RESTRUCTURE*). We capture accounting application and measurement risk through sales growth (*SALEGRW*) and level of inventory (*INVENTORY*). Finally, we measure resource constraints through the market value of equity (*MKTV*), existence of a loss (*LOSS*), and bankruptcy probability (*RZSCORE*). We include age of the firm (*AGE*) since Doyle et al. (2007a) suggest that older firms have better internal controls.

Table 1, Panel A reports mean and median values of these economic characteristics separately for the ICW and control samples, and the differences across these groups (along with statistical significance). We find that ICW firms (1) have much higher accounting application risk as evidenced by higher sales growth (*SALEGRW*) and inventory levels (*INVENTORY*); (2) have higher resource constraints as evidenced by lower market value (*MKTV*), greater incidence of a loss (*LOSS*), and higher bankruptcy probability (*RZSCORE*); and (3) are somewhat younger (i.e., lower *AGE*) than the control firms. However, we find mixed evidence on (1) complexity of operations—lower number of segments (*SEGMENTS*) but weakly higher incidence of foreign operations (*FOREIGN*) for ICW firms; and (2) organizational change—lower incidence of mergers (*M&A*) but higher incidence of restructuring activity (*RESTRUCTURE*) for ICW firms.

Table 1, Panel B reports results of the logit estimation of Equation (1). The logit results are largely consistent with the descriptive analysis in Panel A. Specifically, the likelihood of having an internal control weakness increases with the incidence of foreign operations (*FOREIGN*); increases with account application risk factors *SALEGRW* and *INVENTORY*; increases when a company experiences an organizational change such as a restructuring activity (*RESTRUCTURE*); and increases with resource constraints, that is, lower market value (*MKTV*), greater losses (*LOSS*), and higher bankruptcy probability (*RZSCORE*).

In summary, we find that ICWs are associated with incidence of foreign operations, restructuring activity, account application risk (higher inventory levels and sales growth), and resource constraints (lower market value, greater losses, and bankruptcy risk). Our results are generally consistent with those in Ashbaugh-Skaife et al. (2007), Ge and McVay (2005), and Doyle et al. (2007a).

TABLE 1
Firm Characteristics Associated with Internal Control Weaknesses: June 2004

Panel A: Mean and Median Differences between Weakness and Control Firms

		Means				Medians			
	# Obs. Used	Full Sample	ICW	Control	ICW − Control	Full Sample	ICW	Control	ICW − Control
MKTV ($ MM)	2,465	3,286	1,289	3,602	−2,313 (0.00)	850	478	973	−495 (0.00)
RZSCORE	2,515	5.221	5.737	5.139	0.598 (0.00)	5.000	6.000	5.000	1.000 (0.00)
SEGMENTS	2,515	2.117	1.988	2.138	−0.149 (0.10)	1.000	1.000	1.000	0.000 (0.06)
FOREIGN	2,515	0.190	0.217	0.186	0.031 (0.18)	—	—	—	— —
SALEGRW	2,515	0.173	0.211	0.166	0.045 (0.04)	—	—	—	— —
INVENTORY	2,490	0.079	0.094	0.076	0.017 (0.01)	0.028	0.034	0.028	0.006 (0.06)
M&A	2,515	0.642	0.590	0.650	−0.060 (0.03)	—	—	—	— —
RESTRUCTURE	2,515	0.415	0.462	0.408	0.055 (0.05)	—	—	—	— —
LOSS	2,515	0.253	0.384	0.232	0.152 (0.00)	—	—	—	— —
AGE	2,515	17.583	14.538	18.069	−3.531 (0.00)	11.000	9.000	12.000	−3.000 (0.00)
PRED_FERR1	2,465	−0.027	−0.028	−0.027	−0.001 (0.26)	−0.026	−0.027	−0.026	−0.001 (0.23)
PRED_FERR2	2,465	−0.016	−0.013	−0.016	0.003 (0.00)	−0.017	−0.016	−0.018	0.002 (0.01)
VL PRED_FERR1	1,085	−0.017	−0.021	−0.017	−0.004 (0.00)	−0.016	−0.018	−0.016	−0.002 (0.00)

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TABLE 1 (continued)

Panel B: Logit Analysis

Dependent Variables	Independent Variable = *WEAK* Parameter Estimate	$\Pr > \chi^2$
Intercept	−6.620	(0.00)
RZSCORE	0.097	(0.00)
LOG_MKTV	−0.528	(0.00)
LOG_AGE	−0.120	(0.12)
LOSS	0.357	(0.01)
LOG_SEGMENTS	−0.024	(0.83)
FOREIGN	0.430	(0.01)
M&A	−0.049	(0.71)
SALEGRW	0.441	(0.01)
RESTRUCTURE	0.466	(0.00)
INVENTORY	2.115	(0.00)
Likelihood Ratio X^2 ($\Pr > X^2$)	206.962	(<.0001)
Observations Used	2,465	

Panel A compares mean and median characteristics for 2,515 firms that filed first-time Section 404 opinions during the November 2004 to January 2006 period. Of the 2,515 firms, 346 filed adverse reports (ICW firms) and 2,169 filed clean reports (control firms). Observations with values falling into the top and bottom extreme percentiles of the respective continuous variable are deleted. Two-sided p-values for comparisons with the control sample are reported in parentheses: p-values for mean comparisons are based on t-statistics, and p-values for median comparisons are based on a Wilcoxon signed rank test.

Panel B reports results of estimating the logit model: $Prob(WEAK_i) = f\,(\beta + \beta_1 {*}LOG\_SEGMENTS_i + \beta_2 {*}FOREIGN_i + \beta_3 {*}M\&A_i + \beta_4 {*}RESTRUCTURE_i + \beta_5 {*}SALEGRW_i + \beta_6 {*}INVENTORY_i + \beta_7 {*}\ LOG\_MKTV_i + \beta_8 {*}LOSS_i + \beta_9 {*}RZSCORE_i + \beta_{10} {*}LOG\_AGE_i)$. p-values are based on Chi-squared tests. *WEAK* is an indicator variable that takes on a value of 1 if the firm discloses an ICW, and 0 otherwise. All other variables are as defined below. All observations with studentized residuals (of an identical OLS regression) falling into the top and bottom extreme percentiles are deleted, resulting in a sample of 2,465 observations.

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TABLE 1 (continued)

Variable Definitions:

(LOG)_SEGMENTS = (logarithm of) number of business segments reported in 2004 Compustat Segment file for fiscal 2003;

FOREIGN = an indicator variable equal to 1 if the firm has a non-zero foreign currency translation (Compustat data item #150) in fiscal 2003;

M&A = an indicator variable equal to 1 if a company was involved in mergers or acquisitions over the three years preceding June 2004, where M&A data come from the SDC Platinum database;

RESTRUCTURE = an indicator variable equal to 1 if at least one of Compustat annual data items #376, #377, #378, or #379 is not equal to 0 for any fiscal year in 2001–2003;

SALEGRW = an indicator variable that is equal to 1 if industry-adjusted growth in sales (Compustat data item #12) falls into the top quintile in fiscal 2003;

INVENTORY = inventory (Compustat annual data item #3) over total assets (Compustat annual data item #6);

(LOG_)MKTV = (logarithm of) market value of equity, where market value of equity is equal to price per share multiplied by number of shares outstanding in I/B/E/S as of the end of June 2004;

LOSS = an indicator variable equal to 1 if earnings before extraordinary items (Compustat data item #18) in 2002 and 2003 sum to less than 0;

RZSCORE = decreasing decile rank of Altman's (1968) Z-Score (computed as decile rank of Z-score times −1 and plus 10);

(LOG_)AGE = (logarithm of) number of years the firm exists in CRSP database; and

(VL) *PRED_FERR1, 2* = (Value Line) I/B/E/S one- or two-year-ahead predicted forecast errors, computed using the Liu and Su (2005) model (see Appendix B for details).

IV. IMPLIED COST OF EQUITY AND INTERNAL CONTROL WEAKNESS

Measuring Implied Cost of Equity

As in prior research (e.g., Botosan 1997), we use implied cost of equity to proxy for the firms' cost-of-equity capital. Implied-cost-of-equity estimates are internal rates of return (IRR) that equate current stock prices to expected future payoffs and are estimated by inverting the relation between analysts' forecasts of future earnings and current stock prices. Prior research generates several alternative estimates of implied cost of equity. In general, the estimation methods differ in terms of the valuation model used and assumptions regarding terminal value computation. Prior research evaluates alternative empirical measures of implied cost of equity and reaches different conclusions on their relative merits and demerits (e.g., Guay et al. 2005; Easton and Monahan 2005; Botosan and Plumlee 2005). We report results using several alternative estimates to ensure that our results are robust to method choice.

The first two methods that we use are book-value growth specifications based on Ohlson (1995): the industry ROE method developed by Gebhardt et al. (2001), labeled GLS; and the economy-wide growth method of Claus and Thomas (2001), labeled CT. The next three methods are earnings growth specifications based on Ohlson and Juettner-Nauroth (2005): the unrestricted abnormal earnings growth method of Gode and Mohanram (2003), labeled GM; the restricted abnormal earnings growth method developed by Easton (2004), labeled PEG; and the unrestricted abnormal growth method incorporating long-term growth forecasts, which we derive and label OJ.

All of the five methods above make assumptions regarding long-term earnings growth rates used to derive terminal values. These assumptions introduce significant measurement error in the estimation of cost of equity (Easton and Monahan 2005). Accordingly, we estimate two other measures of cost of equity that are arguably less susceptible to errors in long-term growth assumptions. First, we use the expected rates of return provided by Value Line (VL), which have been used by several authors (e.g., Francis et al. 2004; Ashbaugh-Skaife et al. 2006). Second, we use the methodology developed by Easton (2004) to simultaneously estimate cost of equity and long-term growth rates (EAST). Since the Easton (2004) method can estimate cost of equity only for a portfolio of stocks, we estimate by-firm measures of cost of equity through a bootstrapping procedure using randomly selected firms. We provide details on the derivation and estimation of all our cost-of-equity measures in Appendix A.

The data necessary for cost-of-equity estimation are obtained from the I/B/E/S and Compustat databases. An important design feature in our study is that we measure cost of equity for our entire sample of firms at an identical point in time, which ensures that our results are not contaminated by intertemporal changes in cost of equity attributable to macroeconomic factors. In our primary tests, we estimate implied cost of equity as of the end of June 2004, which is at least five months prior to any of the Section 404 disclosures.[8] By choosing a point in time before the disclosure of Section 404 reports, we investigate whether ICW firms are inherently riskier than control firms. However, such a design does not incorporate ICW disclosure effects. Accordingly, we also conduct sensitivity analyses by replicating all our tests as of June 2006.

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[8] The Value Line Investment Survey has a three-month cycle for covering all followed stocks. Our Value Line estimates used in our primary analyses pertain to the second calendar quarter of 2004 and are not derived at the same point in time for all sample firms. Similarly, our supplementary analyses use Value Line estimates pertaining to the second calendar quarter of 2006.

Primary Analyses: June 2004

Univariate Results

Table 2, Panel A reports the sample sizes for each of the cost-of-equity measures (estimated at the end of June 2004). Except for VL, the measures generate samples of at least 2,107 firms (i.e., at least 84 percent of all available firms), with PEG generating the largest sample (2,369 firms, or 94 percent of all available firms). The VL measure is available for only 1,107 firms, which is less than 50 percent of all available firms. The smaller sample is largely due to VL's limited coverage. The proportion of ICW firms ranges from 12 percent to 14 percent for most of the samples; the VL sample is again exceptional, with fewer than 9 percent ICW firms. Unreported results suggest that the distribution parameters for our cost-of-equity estimates are generally consistent with those reported in prior research (e.g., Guay et al. 2005; Easton and Monahan 2005; Botosan and Plumlee 2002, 2005).

Table 2, Panel A examines differences in mean and median cost of equity between ICW and control firms at the end of June 2004 for each of our seven measures. The actual number of observations used in our tests is smaller than the available sample because we delete outliers. Mean cost of equity is higher for ICW firms compared to control firms for all measures with exception of EAST (the differences in CT and EAST are not statistically significant at conventional levels). The differences range from a low of –41 basis points for EAST to 289 basis points for VL; the average difference across all seven measures is 80 basis points. Median differences show qualitatively similar patterns, although the differences are somewhat weaker both economically and statistically (the average difference in medians across all seven measures is 73 basis points). Overall, univariate comparisons indicate that firms reporting ICW are generally associated with higher cost of equity at the end of June 2004.

Controlling for Firm Characteristics and Forecast Bias

We next examine whether the ICW firms continue to exhibit higher cost of equity after controlling for correlated omitted variables. We control for two sets of factors. First, we control for various primitive firm characteristics that are associated with ICW. In Section III we show that several characteristics, such as size, complexity of operations, and distress, are associated with ICW firms. Some of these characteristics (e.g., size and distress) have been conjectured to proxy for systematic risk in the finance literature (Fama and French 1995, 1996). In addition, factors such as complexity of operations could increase a firm's systematic risk. Therefore, it is important to examine whether the higher cost of equity associated with ICW firms is indeed attributable to ICW per se or arises merely from correlation with more primitive firm characteristics. Second, we control for bias in analysts' forecasts. Since implied-cost-of-equity estimates use analysts' forecasts as inputs, forecast bias has been shown to cause bias in these estimates (Easton and Monahan 2005; Guay et al. 2005). Table 1 reveals differences between ICW and control firms in one-year-ahead and two-year-ahead analysts' predicted forecast errors. Accordingly, as in Dhaliwal et al. (2005), we control for analyst forecast bias.

We examine differences in implied costs of equity across ICW and control firms through the following cross-sectional OLS regression that includes all firm characteristics from Equation (1) and a proxy for predicted forecast errors (where subscript i denotes firm):

TABLE 2
Differences across Weakness and Control Firms for Various Implied Cost of Equity Measures: June 2004

		OJ	GLS	CT	PEG	GM	VL	EAST
Panel A: Mean and Median Differences between Weakness and Control Firms								
Sample Size		2,107	2,248	2,186	2,369	2,206	1,107	2,206
Observations Used		2,065	2,204	2,144	2,323	2,162	1,088	2,162
	ICW	0.1073	0.0811	0.0810	0.1237	0.1222	0.1386	0.1008
Means	Control Sample	0.1027	0.0792	0.0808	0.1085	0.1130	0.1097	0.1048
	ICW – Control	0.0046	0.0018	0.0002	0.0152	0.0092	0.0289	−0.0041
		(0.00)	(0.11)	(0.89)	(0.00)	(0.00)	(0.00)	(0.49)
	ICW	0.1048	0.0791	0.0809	0.1068	0.1116	0.1350	0.1049
Medians	Control Sample	0.1011	0.0784	0.0802	0.0964	0.1047	0.1050	0.1061
	ICW – Control	0.0038	0.0007	0.0007	0.0103	0.0070	0.0300	−0.0012
		(0.00)	(0.18)	(0.80)	(0.00)	(0.00)	(0.00)	(0.99)
Panel B: Multiple Regression Analysis								
Intercept		0.0909	0.0427	0.0576	0.0348	0.0433	0.1593	0.1649
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WEAK		0.0008	−0.0016	−0.0016	0.0013	0.0004	0.0208	0.0019
		(0.56)	(0.07)	(0.17)	(0.58)	(0.83)	(0.00)	(0.75)
LOG_MKTV		−0.0021	−0.0022	−0.0011	−0.0076	−0.0060	0.0066	0.0024
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.11)
RZSCORE		0.0000	0.0004	0.0013	0.0023	0.0012	−0.0013	−0.0019
		(0.95)	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.03)
LOG_SEGMENTS		−0.0010	0.0016	0.0000	−0.0001	0.0008	−0.0058	0.0034
		(0.16)	(0.00)	(0.98)	(0.92)	(0.45)	(0.02)	(0.29)
FOREIGN		−0.0007	0.0016	−0.0014	0.0078	0.0069	−0.0065	0.0077
		(0.56)	(0.03)	(0.17)	(0.00)	(0.00)	(0.09)	(0.14)
SALEGRW		0.0113	0.0015	0.0069	0.0030	0.0046	0.0066	0.0096
		(0.00)	(0.05)	(0.00)	(0.17)	(0.01)	(0.18)	(0.08)

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TABLE 2 (continued)

INVENTORY	0.0254	0.0341	0.0451	0.0405	0.0226	0.0239	−0.0438
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.07)	(0.01)
M&A	−0.0039	−0.0005	−0.0034	−0.0041	−0.0032	0.0016	−0.0062
	(0.00)	(0.46)	(0.00)	(0.02)	(0.02)	(0.67)	(0.16)
RESTRUCTURE	0.0007	0.0029	0.0000	0.0088	0.0063	0.0029	0.0061
	(0.53)	(0.00)	(0.98)	(0.00)	(0.00)	(0.40)	(0.17)
LOSS	−0.0020	0.0042	−0.0058	0.0428	0.0308	0.0070	−0.0167
	(0.12)	(0.00)	(0.00)	(0.00)	(0.00)	(0.17)	(0.00)
LOG_AGE	−0.0013	−0.0014	0.0005	0.0007	0.0022	−0.0109	−0.0047
	(0.02)	(0.00)	(0.28)	(0.47)	(0.00)	(0.00)	(0.05)
PRED_FERR	−0.0490	−0.7824	−0.3226	0.3303	−0.3375	−1.4920	0.8883
	(0.17)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations Used	2,065	2,204	2,144	2,323	2,162	1,085	2,162
Adjusted R^2	11.67%	48.71%	20.11%	36.09%	28.49%	13.86%	4.23%

The table compares implied cost of capital estimates as of June 2004 for a sample of 2,515 firms that filed first-time Section 404 opinions during the November 2004 to January 2006 period. Of the 2,515 firms, 346 filed adverse reports (ICW firms) and 2,169 filed clean reports (control firms). Sample size varies depending on the cost-of-equity proxy used. Cost-of-equity proxies are: OJ: a measure based on the Ohlson and Juettner-Nauroth (2005) model incorporating analysts' long-term earnings growth forecasts; GLS: the industry ROE method developed by Gebhardt et al. (2001); CT: the economy-wide growth method of Claus and Thomas (2001); PEG: the restricted abnormal earnings growth (or PEG) method developed by Easton (2004); GM: the unrestricted abnormal earnings growth method of Gode and Mohanram (2003); VL: expected rate of return according to the Value Line Investment Survey; and EAST: cost of equity derived from our modified version of simultaneous cost-of-equity and growth computation. Details on the estimation of all cost-of-equity measures are provided in Appendix A.

Panel A contains mean and median cost-of-equity comparisons. Observations with values falling into the top and bottom extreme percentiles of the respective variable are deleted. "Sample size" indicates the size of the sample before truncation and "Observations Used" after truncation. Two-sided p-values for comparisons with control sample are reported in parentheses: p-values for mean comparisons are based on t-statistics and p-values for median comparisons are based on a Wilcoxon signed rank test.

(*continued on next page*)

TABLE 2 (continued)

Panel B reports results for the following regression:

$$COEC_i = \delta + \delta_0 {*} WEAK_i + \delta_1 {*} LOG\_SEGMENTS_i + \delta_2 {*} FOREIGN_i + \delta_3 {*} M\&A_i + \delta_4 {*} RESTRUCTURE_i + \delta_5 {*} SALEGRW_i + \delta_6 {*} INVENTORY_i + \delta_7 {*} LOG\_MKTV_i b + \delta_8 {*} LOSS_i + \delta_9 {*} RZSCORE_i + \delta_{10} {*} LOG\_AGE_i + \delta_{11} {*} PRED\_FERR_i + \varepsilon$$

where:

COEC = one of the seven cost-of-equity estimates defined above;
WEAK = indicator variable that takes on a value of 1 if the firm discloses an ICW, and 0 otherwise; and
PRED_FERR = average of one-year-ahead and two-year-ahead predicted forecast errors, computed using the Liu and Su (2005) model.

For the Value Line cost-of-equity analysis, *PRED_FERR* = one-year-ahead predicted forecast error estimated using Value Line data (see Appendix B for details). All other control variables are as defined in Table 1.
We delete 1 percent of the observations with the smallest and the largest values of studentized residuals to remove the effect of outliers. Two-sided p-values are reported in parentheses.

$$\begin{aligned} COEC_i = {} & \delta + \delta_0{*}WEAK_i + \delta_1{*}LOG\_SEGMENTS_i + \delta_2{*}FOREIGN_i \\ & + \delta_3{*}M\&A_i + \delta_4{*}RESTRUCTURE_i + \delta_5{*}SALEGRW_i \\ & + \delta_6{*}INVENTORY_i + \delta_7{*}LOG\_MKTV_i + \delta_8{*}LOSS_i \\ & + \delta_9{*}RZSCORE_i + \delta_{10}{*}LOG\_AGE_i + \delta_{11}{*}PRED\_FERR_i + \varepsilon_i, \end{aligned} \tag{2}$$

where:

COEC = one of the seven proxies for implied cost-of-equity capital; and

PRED_FERR = one-year-ahead (average of one- and two-year-ahead) predicted forecast error for the VL regression (all other regressions), computed using the Liu and Su (2005) model; see Appendix B for details.

All other variables are as defined earlier.

Table 2, Panel B reports results of estimating the above model (as of June 2004). The number of observations used in the regressions is smaller than the available sample reported in Panel A because we delete influential observations. After including controls for underlying firm characteristics and forecast bias, we find little evidence suggesting that the implied cost of equity is higher for ICW firms. Specifically, the coefficients on *WEAK* are either negative or insignificant at conventional levels of significance, suggesting that implied cost of equity is not higher for ICW firms than for control firms. The one exception is VL, where the ICW firms display both economically (208 basis points) and statistically ($p < 0.01$) higher cost of equity.

We make no predictions about the direction of the relation between characteristics associated with ICW and implied cost of equity, because with few exceptions it is difficult to predict the direction. Accordingly, we only report some of the consistent patterns that we observe across our regressions. Smaller firm size (lower *MKTV*) and higher bankruptcy probability (*RZSCORE*) are positively associated with implied cost of equity with the exception of VL and EAST.[9] Application risk measures (*SALEGRW* and *INVENTORY*) are generally positively associated with cost of equity. The association between cost of equity and organizational change is mixed: mergers (*M&A*) appear to reduce cost of equity while restructuring activity (*RESTRUCTURE*) appears to increase cost of equity. Finally, predicted forecast bias (*PRED_FERR*) is strongly negatively associated with implied cost of equity for most measures, suggesting that analysts' forecast optimism tends to increase cost-of-equity estimates (note that *negative* values of *PRED_FERR* indicate forecast optimism).[10]

Overall, we are unable to find evidence suggesting that ICW is directly associated with implied cost of equity as of June 2004. The higher cost of equity reported in the univariate analyses, with the exception of VL, appears to be attributable to primitive firm characteristics that are associated with ICW.[11] We analyze the differential VL results in detail in a later section.

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[9] Since market value of equity is a risk proxy (e.g., Fama and French 1996), including market value of equity in the regression may capture variation in risk attributable to Section 404 weakness. Accordingly, in a sensitivity test we replace log(market value) with log(total assets) and find qualitatively similar results.

[10] Some of the signs on the coefficients in the regressions are opposite from our expectations (e.g., positive (negative) coefficients on *LOG_MKTV* (*RZSCORE*) for the VL and EAST regressions). We rule out multicollinearity as a reason for these results—the maximum variance inflation factor (not tabulated) does not exceed 1.4 in any of our models. Also, we find that in most cases, the anomalous relation is also present at the univariate level, suggesting that the anomalous relations are a peculiarity of the Section 404 sample. For example, the univariate correlations between VL and *LOG_MKTV* (*RZSCORE*) are negative (positive) when we use the entire Compustat-Value Line universe to compute correlation coefficients.

Alternative Estimation Period

Our primary analyses, which are conducted prior to the Section 404 disclosures (June 2004), ignore the disclosure effects of ICW, if any, on stock prices. To ensure that our results are not sensitive to the choice of period under analysis, we also replicate our primary tests as of June 2006. Since our sample comprises Section 404 disclosures up to January 2006, examining cost of equity as of June 2006 ensures that all potential disclosure effects are incorporated in our cost-of-equity estimates.

Table 3 reports results of the June 2006 analyses. Our sample for the June 2006 analyses comprises 2,357 firms (311 ICW and 2,046 control firms), although the actual number of observations used is smaller based on availability of cost of equity data for our alternative measures as well as deletion of outliers. We report both univariate (Panel A) and multivariate regression (Panel B) analyses. For our cross-sectional multivariate regressions, we employ the following model (where subscript *i* denotes firm):

$$\begin{aligned} COEC_i = {} & \delta + \delta_0{*}WEAK_i + \delta_1{*}REMED_i + \delta_2{*}LOG\_SEGMENTS_i \\ & + \delta_3{*}FOREIGN_i + \delta_4{*}M\&A_i + \delta_5{*}RESTRUCTURE_i \\ & + \delta_6{*}SALEGRW_i + \delta_7{*}INVENTORY_i + \delta_8{*}LOG\_MKTV_i \\ & + \delta_9{*}LOSS_i + \delta_{10}{*}RZSCORE_i + \delta_{11}{*}LOG\_AGE_i \\ & + \delta_{12}{*}PRED\_FERR_i + \varepsilon_i, \end{aligned} \tag{3}$$

where:

REMED = indicator variable that equals 1 if a firm reports an adverse Section 404 report in its first year but reports a clean report subsequently, and 0 otherwise.

All other variables are as defined earlier, although the estimation periods are different to correspond to the 2006 time period. Equation (3) is identical to Equation (2) but for the inclusion of *REMED*, which is an indicator variable that switches on for ICW firms that subsequently remediate their internal control weaknesses. We include a control for remediation because some of our sample firms had reported their second year of Section 404 disclosures by June 2006 and Ashbaugh-Skaife et al. (2006) argue that cost of equity declines for firms that remediate their internal control deficiencies.

The results from our June 2006 analyses are qualitatively similar to those from our June 2004 analyses. That is, while mean and median cost of equity are higher for ICW firms for some of our cost-of-equity proxies, the *WEAK* coefficient (which examines differences after controlling for factors associated with ICW) is insignificant at conventional levels. Interestingly, there is little evidence that firms that remediated their internal control

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[11] To see whether our "non-result" in the multiple regressions is due to low power, we examine the power of our regressions. We find that the probability of rejecting the null of "no difference" when the "true" difference in cost of equity is 50 (100) basis points is 0.93 (1.00), 1.00 (1.00), 0.99 (1.00), 0.59 (0.99), 0.74 (1.00), 0.14 (0.42), and 0.13 (0.39) for the regressions with OJ, GLS, CT, PEG, GM, VL, and EAST, respectively, as the dependent variables. This suggests that, with the exception of the VL and EAST proxies, our regressions reject the null with almost certainty for a 100 basis-point difference and with high probability even for a 50 basis-points difference. Therefore, low power is unlikely the cause of our "non-result."

TABLE 3
Differences across Weakness and Control Firms for Various Implied Cost of Equity Measures: June 2006

		OJ	GLS	CT	PEG	GM	VL	EAST
Panel A: Mean and Median Differences between Weakness and Control Firms								
Sample Size		1,910	2,064	1,943	2,197	2,072	1,118	2,075
Observations Used		1,872	2,024	1,905	2,155	2,032	1,097	2,035
	ICW	0.1111	0.0810	0.0862	0.1217	0.1241	0.1155	0.1086
Means	Control Sample	0.1071	0.0809	0.0866	0.1059	0.1128	0.1093	0.1120
	ICW – Control	0.0040	0.0001	−0.0004	0.0159	0.0113	0.0062	−0.0034
		(0.02)	(0.95)	(0.76)	(0.00)	(0.00)	(0.34)	(0.68)
	ICW	0.1077	0.0811	0.0858	0.1063	0.1161	0.1150	0.1079
Medians	Control Sample	0.1051	0.0801	0.0855	0.0955	0.1053	0.1100	0.1128
	ICW – Control	0.0026	0.0010	0.0004	0.0108	0.0108	0.0050	−0.0048
		(0.02)	(0.97)	(0.77)	(0.00)	(0.00)	(0.32)	(0.56)
Panel B: Multiple Regression Analysis								
Intercept		0.1052	0.0479	0.0768	0.0514	0.0610	0.1716	0.1465
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
WEAK		0.0014	−0.0017	0.0018	−0.0019	0.0018	0.0184	−0.0045
		(0.47)	(0.17)	(0.21)	(0.51)	(0.45)	(0.02)	(0.64)
REMED		0.0037	0.0017	−0.0037	0.0131	0.0063	−0.0336	0.0182
		(0.29)	(0.43)	(0.14)	(0.01)	(0.16)	(0.01)	(0.31)
LOG_MKTV		−0.0006	−0.0017	0.0006	−0.0060	−0.0051	0.0063	−0.0005
		(0.11)	(0.00)	(0.05)	(0.00)	(0.00)	(0.00)	(0.83)
RZSCORE		−0.0007	0.0006	0.0003	0.0005	0.0001	−0.0032	−0.0047
		(0.00)	(0.00)	(0.05)	(0.15)	(0.86)	(0.00)	(0.00)
LOG_SEGMENTS		0.0009	0.0018	0.0006	−0.0020	0.0009	−0.0059	0.0055
		(0.28)	(0.00)	(0.35)	(0.14)	(0.45)	(0.02)	(0.22)
FOREIGN		0.0007	0.0027	0.0004	0.0043	0.0013	−0.0077	−0.0029
		(0.58)	(0.00)	(0.67)	(0.04)	(0.46)	(0.05)	(0.68)
SALEGRW		0.0083	−0.0003	0.0028	0.0083	0.0083	0.0002	0.0139
		(0.00)	(0.78)	(0.01)	(0.00)	(0.00)	(0.98)	(0.09)

(*continued on next page*)

TABLE 3 (continued)

	OJ	GLS	CT	PEG	GM	VL	EAST
INVENTORY	0.0182	0.0319	0.0224	0.0657	0.0287	−0.0094	−0.0456
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.51)	(0.10)
M&A	−0.0013	−0.0011	−0.0024	0.0018	−0.0006	0.0056	−0.0013
	(0.26)	(0.14)	(0.01)	(0.34)	(0.71)	(0.18)	(0.84)
RESTRUCTURE	−0.0023	0.0027	−0.0017	0.0048	0.0050	0.0049	0.0091
	(0.04)	(0.00)	(0.05)	(0.01)	(0.00)	(0.17)	(0.14)
LOSS	0.0091	0.0044	0.0051	0.0581	0.0260	0.0247	−0.0129
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.24)
LOG_AGE	−0.0027	−0.0005	−0.0005	−0.0001	0.0011	−0.0120	−0.0094
	(0.00)	(0.31)	(0.38)	(0.93)	(0.26)	(0.00)	(0.02)
PRED_FERR	−0.4665	−1.0952	−0.8984	0.1743	−0.5548	−1.4692	−0.6082
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.11)
Adjusted R^2	9.18%	40.48%	24.26%	30.23%	15.46%	8.89%	1.02%

The table compares implied cost of capital estimates as of June 2006 for a sample of 2,357 firms that filed first-time Section 404 opinions during the November 2004 to January 2006 period. Of the 2,357 firms, 311 filed adverse reports (ICW firms) and 2,046 filed clean reports (control firms). Sample size varies depending on the cost-of-equity proxy used. Cost-of-equity proxies are: OJ: a measure based on the Ohlson and Juettner-Nauroth (2005) model incorporating analysts' long-term earnings growth forecasts; GLS: the industry ROE method developed by Gebhardt et al. (2001); CT: the economy-wide growth method of Claus and Thomas (2001); GM: the unrestricted abnormal earnings growth method of Gode and Mohanram (2003); PEG: the restricted abnormal earnings growth (or PEG) method developed by Easton (2004); EAST: cost of equity derived from our modified version of simultaneous cost-of-equity and growth computation; and VL: expected rate of return according to the Value Line Investment Survey. Details on the estimation of all cost-of-equity measures are provided in Appendix A.

Panel A contains mean and median cost-of-equity comparisons. Observations with values falling into the top and bottom extreme percentiles of the respective variable are deleted. "Sample size" indicates the size of the sample before truncation and "Observations used" after truncation. Two-sided p-values for comparisons with control sample are reported in parentheses: p-values for mean comparisons are based on t-statistics and p-values for median comparisons are based on a Wilcoxon signed rank test.

(*continued on next page*)

TABLE 3 (continued)

Panel B reports results for the following regression:

$$\begin{aligned} COEC_i = {} & \delta + \delta_0{*}WEAK_i + \delta_1{*}REMED_i + \delta_2{*}LOG\_SEGMENTS_i + \delta_3{*}FOREIGN_i + \delta_4{*}M\&A_i + \delta_5{*}RESTRUCTURE_i + \delta_6{*}SALEGRW_i \\ & + \delta_7{*}INVENTORY_i + \delta_8{*}LOG\_MKTV_i + \delta_9{*}LOSS_i + \delta_{10}{*}RZSCORE_i + \delta_{11}{*}LOG\_AGE_i + \delta_{12}{*}PRED\_FERR_i + \varepsilon \end{aligned}$$

where:

COEC = one of the seven cost-of-equity estimates defined above;
WEAK = an indicator variable that takes on a value of 1 if the firm discloses an ICW, and 0 otherwise;
REMED = an indicator variable that takes on a value of 1 if the firm disclosed an ICW in 2004 and reported no ICW in 2006, and 0 otherwise; and
PRED_FERR = average of one-year-ahead and two-year-ahead predicted forecast errors, computed using the Liu and Su (2005) model.

For the Value Line cost-of-equity analysis, *PRED_FERR* = one-year-ahead predicted forecast error estimated using Value Line data (see Appendix B for details). All other control variables are as defined in Table 1.
We delete 1 percent of the observations with the smallest and the largest values of studentized residuals to remove the effect of outliers. Two-sided p-values are reported in parentheses.

weaknesses have lower cost of equity. The VL results continue to be different: there is evidence that the VL cost of equity is higher for ICW firms than for control firms, but this difference is more than compensated for those firms that subsequently remediate the weaknesses. Our VL results are consistent with those of Ashbaugh-Skaife et al (2006).[12]

Analysis by Type of Weakness

Finally, we examine whether there are differences in our results when we partition our sample by type of weakness. Doyle et al. (2007a) suggest that certain types of ICWs are more egregious than others. Accordingly, we use the classifications provided by Audit Analytics and examine whether different types of ICWs have higher costs of equity than our control firms. We group ICWs into several (overlapping) subclassifications including presence of multiple weaknesses; presence of personnel problems; presence of governance issues; presence of accounting/information systems-related problems; presence of systemic problems; presence of accounting restatements; and late filers, i.e., accelerated filers that delayed filing their Section 404 reports for at least six months following the fiscal year-end. While we find that some of these partitions have higher costs of equity than our control firms in univariate tests, none of the partitions have significantly different costs of equity in multiple regressions, both as of June 2004 and June 2006.[13] For brevity, we do not tabulate these results.

V. ADDITIONAL ANALYSES

In this section we report results of additional analyses and sensitivity tests aimed at increasing the confidence in our main empirical results. We first evaluate the construct validity of our cost-of-equity proxies through future returns association and measurement error analyses. Next, we examine whether several intermediate risk attributes (proxies for earnings quality, information asymmetry, and systematic risk) are associated with ICW. Corroborating evidence using risk attributes that are theoretically expected to be associated with ICW should provide assurance that our primary results are not driven by measurement error in our cost-of-equity proxies. Finally, we explore why our VL results are different from those using other proxies.

Tests of Construct Validity

The ultimate test of construct validity of a cost-of-equity proxy is its association with future *expected* returns on the firm's stock. Easton and Monahan (2005) (hereafter, E&M) propose a method that evaluates the association of a cost-of-equity proxy with future expected returns through a regression of future *realized* returns on the cost-of-equity proxy after controlling for future cash flow and discount rate shocks. After controlling for cash flow and discount rate news, E&M find that most cost-of-equity proxies are *negatively* correlated with realized stock returns and have significant measurement error. Accordingly, they conclude that most cost-of-equity proxies (with the exception of CT under certain conditions) lack construct validity.

To evaluate construct validity of our seven cost-of-equity proxies, we replicate the E&M analyses for our sample (as of June 2004). The E&M analysis primarily involves regressing the log of one-year-ahead stock returns on the log of the respective cost-of-equity measure (proxy for expected return) and the log of proxies for cash flow news and discount rate news over the following year. Table 4 reports results of these regressions, where each row corresponds to one of the alternative cost-of-equity proxies. A coefficient on the expected return proxy (*LOG(ER)*) close to +1 would indicate that the cost-of-equity proxy measures expected return accurately, i.e., has high construct validity. With the exception of the CT measure, we find that the coefficients on *LOG(ER)* are either negative and significant or insignificant. When CT is used as a proxy for expected return, the coefficient is +0.88, which is significantly positive ($p < 0.01$) and statistically indistinguishable from the theoretical value of +1 ($p = 0.74$).

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[12] We also examine changes in cost of equity between June 2004 and June 2006 and do not find any evidence that cost of equity increased over this period for the ICW firms (with the exception of the VL measure).

[13] Hribar and Jenkins (2004) find an increase in cost of equity after firms announce restatements. Our results likely differ from theirs because we examine only ICW firms (i.e., those reporting a Section 404 weakness) that also restate their financial statements, rather than restatements in general.

E&M also conduct further tests of measurement error by modifying techniques developed by Garber and Klepper (1980). They construct two statistics for the extent of measurement error, one that controls for correlation in the measurement errors across the three variables in the regression and one that does not. In Column 8 of Table 4 we report the statistic that controls for correlation in measurement error, as it is better specified. We find that all proxies have statistically significant measurement error with the exception of CT, which also has the smallest measurement error coefficient.

To summarize, our tests of construct validity suggest the following. First, with the exception of CT, our cost-of-equity proxies have low construct validity because of significant measurement error. Second, the CT proxy has high construct validity: its regression coefficient on future expected returns is indistinguishable from the theoretical value of +1 and it also has the lowest measurement error (which is insignificant). Results from using the CT method are consistent with our primary inference, i.e., cost of equity for ICW firms is not higher than that for control firms. Therefore, the construct validity tests provide some assurance that our conclusions are not driven by measurement error in our cost-of-equity proxies.

Internal Control Weakness and Risk Attributes

To corroborate our cost-of-equity results, we explore differences between ICW and control firms in underlying risk attributes that theory suggests should be associated with ICW. In Section II, we hypothesize a two-step link between ICW and cost of equity. First, we relate ICW to accounting quality. Accordingly, we first examine whether ICW is associated with earnings quality proxies, such as signed and absolute discretionary accruals. Second, we hypothesize that information (accounting) quality can affect cost of equity through information asymmetry (Easley and O'Hara 2004) or through its effect on conventional risk measures, such as beta (Lambert et al. 2007). Accordingly, we next examine the association between ICW and the probability of informed trading (*PIN*) or market risk measures (beta and idiosyncratic risk). We conduct all our risk attribute tests as of June 2004.

Doyle et al. (2007b), Ashbaugh-Skaife et al. (2007), and Hogan and Wilkins (2005) report that absolute discretionary accruals are higher for a sample of firms disclosing material weaknesses under Sections 302 and 404. Accordingly, we first examine differences in both signed and absolute Jones (1991) model residuals (discretionary accruals) between our ICW and control firms. Because discretionary accruals are affected by firm performance, we also examine differences in signed and absolute performance-matched discretionary accruals (Kothari et al. 2004).

Easley and O'Hara (2004) suggest that information risk affects systematic risk through information asymmetry. In a companion paper (Easley et al. 2002), they test their theory

TABLE 4
Construct Validity Tests of Cost of Equity Proxies: June 2004

		Future Returns Regression					Modified Noise Coefficient
Proxy (1)	n (2)	Intercept (3)	*LOG_ER* (4)	*LOG_CN* (5)	*LOG_RN* (6)	R^2 % (7)	(8)
OJ	1629	0.1023	0.0557	1.1337	0.0117	29.84	0.0011
		(0.00)	(0.86)	(0.00)	(0.05)		(0.00)
GLS	1777	0.2403	−1.7012	0.8805	0.2010	47.50	0.0002
		(0.00)	(0.00)	(0.00)	(0.00)		(0.06)
CT	1698	0.0349	0.8882	0.9581	0.0432	33.09	0.0001
		(0.18)	(0.01)	(0.00)	(0.00)		(0.27)
PEG	1854	0.2267	−1.3904	0.5399	0.0372	31.80	0.0050
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)
GM	1699	0.1252	−0.1529	0.9810	0.0217	26.58	0.0020
		(0.00)	(0.49)	(0.00)	(0.00)		(0.00)
VL	907	0.2234	−0.8973	0.8086	0.0333	40.57	0.0043
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)
EAST	1701	0.1174	−0.0279	1.0496	−0.0035	27.30	0.0093
		(0.00)	(0.73)	(0.00)	(0.00)		(0.00)

The table reports the results of reliability evaluation for the cost-of-equity measures using the Easton and Monahan (2005) method. The sample consists of 2,515 firms that filed first-time Section 404 opinions during the period November 2004 to January 2006. The actual number of observations used in each test (n) is lower because of additional data required to implement the Easton-Monahan analyses. Cost-of-equity estimates are defined in Table 2. Columns (3) to (7) contain regression coefficients and R^2 for the regressions of realized returns on the proxies for expected return, cash flow news, and expected return news: $LOG\_RET_{i,t+1}$ = Intercept + $\alpha_1 * LOG\_ER_{i,t}$ + $\alpha_2 * LOG\_CN_{i,t+1}$ + $\alpha_3 * LOG\_RN_{i,t+1}$ + ε_i, where $LOG\_RET_{i,t+1}$ is the realized return over the one year after the cost-of-equity estimation, LOG_ER_i is the expected return (one of the cost-of-equity estimates) as of June 2004, $LOG\_CN_{i,t+1}$ is the cash flow news measured over the one year after the cost-of-equity estimation, and $LOG\_RN_{i,t+1}$ is the discount rate news over the one year after the cost-of-equity estimation. All return measures are continuously compounded. Column (8) reports a modified noise coefficient for each cost-of-equity measure.

Cash flow news is measured as a sum of the revision in one-year-ahead forecasted ROE and the capitalized revision in the two-year-ahead forecasted ROE: $LOG\_CN_{i,t+1} = \Delta LOG\_FROE_{i,t+1} + \rho/(1 - \rho\omega) * \Delta LOG\_FROE_{i,t+2}$. Revisions refer to changes in forecasts from June 2004 to June 2005. (All analyses are replicated using Value Line analyst report issue dates to measure realized returns and Value Line one-year-ahead earnings forecasts and long-term earnings growth rate forecasts to construct cash flow news proxies. The estimation period therefore starts in the second quarter of 2004 and ends in the second quarter of 2005. Two-year-ahead earnings forecasts are constructed by applying long-term growth rates to one-year-ahead earnings forecasts. The results are similar to those using I/B/E/S data.)

Forecasted ROE is defined as EPS forecast divided by book value of equity (Compustat item #60) divided by number of shares used to calculate EPS (Compustat item #54). We use ρ estimates reported in Easton and Monahan (2005). Persistence coefficients ω_t are estimated through a pooled time-series cross-sectional regression for each of the 48 Fama-French industries: $LOG\_ROE_{i,t-\tau} = \omega_{0t} + \omega_t \times LOG\_ROE_{i,t-(\tau-1),}$ where τ is a number between 0 and 9, and *ROE* is return on equity.

Discount rate news is measured as $LOG\_RN_{i,t+1} = \rho/(1 - \rho) * (LOG\_ER_{I,t+1} - LOG\_ER_{i,t})$ where $LOG\_ER_{i,t}$ is the continuously compounded cost-of-equity estimate measured as of June 2004, and $LOG\_ER_{i,t+1}$ is the continuously compounded cost-of-equity estimate measured as of June 2005.

The details of estimating modified noise coefficient are described in Easton and Monahan (2005, 506–507).

All estimations are performed after deleting observations that fall in the top and bottom 0.5 percent for $LOG\_RET_{i,t+1}$, LOG_ER_i, LOG_CN_i, or LOG_RN_i distributions.

by showing that *PIN*—a measure of information asymmetry—increases in information risk. Accordingly, we examine whether there are differences in the *PIN* measure between our ICW and control firms.

Finally, Lambert et al. (2007) argue that information risk is priced through conventional market risk factors, such as beta. Therefore, we examine whether two measures of market risk, beta and idiosyncratic risk (measured as abnormal return volatility), are different across our weakness and control sample partitions. While beta is a determinant of expected returns under CAPM, there is empirical evidence suggesting that idiosyncratic volatility may be priced by the stock market (Goyal and Santa-Clara 2003). However, it must be noted that much of idiosyncratic volatility is diversifiable and thus idiosyncratic volatility may be an imperfect indicator of systematic risk, and in turn, cost of equity.

Univariate Results

Table 5, Panel A reports mean and median values of various risk attributes for the ICW and control firms, along with the statistical significance of the differences. We examine four measures of discretionary accruals: cross-sectional Jones-model residuals (*DACC*), absolute value of these residuals (*A_DACC*), performance-matched Jones-model residuals (*PM_DACC*), and absolute value of performance-matched residuals (*APM_DACC*). We find that mean and median absolute discretionary accruals are higher for ICW firms (although the differences are marginally significant for *APM_DACC*) but there are no significant differences across ICW and control firms for any of the signed discretionary accruals' measures. Next, we examine the probability of informed trading (*PIN*), beta (*BETA*), and abnormal return volatility (*RETVAR*). While ICW firms have higher information asymmetry (*PIN*), the differences are not statistically significant at conventional levels. Consistent with Bryan and Lilien (2005), average market risk attributes are higher for ICW firms (although the median difference in beta is insignificant).

Overall, we find evidence of lower accrual quality for ICW firms, suggesting higher accounting risk. The higher accounting risk translates into marginally higher information asymmetry and higher market measures of systematic risk.

Controlling for Firm Characteristics

It is important to verify whether ICW continues to be directly associated with risk attributes after controlling for primitive firm characteristics that are associated with ICW. Accordingly, we estimate the following cross-sectional OLS regressions (where subscript *i* denotes firm):

$$\begin{aligned} RISK\text{-}ATTRIBUTE_i = {} & \gamma + \gamma_0{*}WEAK_i + \gamma_1{*}LOG\_SEGMENTS_i \\ & + \gamma_2{*}FOREIGN_i + \gamma_3{*}M\&A_i + \gamma_4{*}RESTRUCTURE_i \\ & + \gamma_5{*}SALEGRW_i + \gamma_6{*}INVENTORY_i \\ & + \gamma_7{*}LOG\_MKTV_i + \gamma_8{*}LOSS_i + \gamma_9{*}RZSCORE_i \\ & + \gamma_{10}{*}LOG\_AGE_i + \varepsilon_i, \end{aligned} \tag{4}$$

where:

RISK-ATTRIBUTE = one of the seven risk attributes examined.

All other variables are as defined earlier.

Table 5, Panel B reports results for these seven regressions. We find that *WEAK* is not significant in explaining either signed or absolute discretionary accruals, suggesting that

TABLE 5
Differences across Weakness and Control Firms for Various Risk Attributes: June 2004

		DACC	*PM_DACC*	*A_DACC*	*APM_DACC*	*PIN*	*BETA*	*RETVAR*
Panel A: Mean and Median Differences between Weakness and Control Firms								
Observations Used		2,063	2,063	2,063	2,063	2,480	2,465	2,465
	ICW	0.015	−0.007	0.063	0.086	0.136	1.387	0.010
Means	Control Sample	0.013	−0.006	0.054	0.079	0.131	1.241	0.007
	ICW − Control	0.001	−0.001	0.009	0.007	0.005	0.146	0.003
		(0.78)	(0.84)	(0.01)	(0.16)	(0.28)	(0.06)	(0.00)
	ICW	0.020	0.005	0.044	0.059	0.126	1.107	0.007
Medians	Control Sample	0.016	−0.003	0.040	0.052	0.124	1.082	0.004
	ICW − Control	0.004	0.008	0.004	0.007	0.003	0.025	0.003
		(0.41)	(0.60)	(0.03)	(0.13)	(0.36)	(0.20)	(0.00)
Panel B: Multiple Regression								
Intercept		−0.0088	−0.0466	0.0409	0.1046	−0.0416	0.3006	−0.0019
		(0.42)	(0.01)	(0.00)	(0.00)	(0.00)	(0.11)	(0.09)
WEAK		0.0026	−0.0005	0.0039	0.0066	−0.0054	−0.0355	0.0009
		(0.56)	(0.95)	(0.27)	(0.22)	(0.21)	(0.64)	(0.04)
LOG_MKTV		−0.0029	−0.0027	−0.0030	−0.0009	−0.0221	−0.0603	−0.0015
		(0.01)	(0.14)	(0.00)	(0.53)	(0.00)	(0.00)	(0.00)
RZSCORE		−0.0015	0.0025	0.0009	−0.0020	0.0033	0.0241	−0.0003
		(0.03)	(0.02)	(0.09)	(0.02)	(0.00)	(0.02)	(0.00)
LOG_SEGMENTS		−0.0005	0.0011	−0.0036	−0.0089	0.0073	−0.1296	−0.0009
		(0.84)	(0.77)	(0.06)	(0.00)	(0.00)	(0.00)	(0.00)
FOREIGN		0.0097	−0.0015	−0.0006	−0.0031	−0.0012	0.2362	−0.0002
		(0.01)	(0.80)	(0.84)	(0.49)	(0.76)	(0.00)	(0.65)
SALEGRW		−0.0012	0.0093	0.0210	0.0254	−0.0164	0.2595	0.0019
		(0.77)	(0.14)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
INVENTORY		0.0017	0.0222	0.0275	0.0107	0.0091	1.0605	0.0051
		(0.90)	(0.27)	(0.01)	(0.49)	(0.47)	(0.00)	(0.00)

(*continued on next page*)

TABLE 5 (continued)

M&A	0.0055	−0.0061	0.0006	−0.0047	−0.0049	0.1397	−0.0003
	(0.10)	(0.24)	(0.83)	(0.24)	(0.12)	(0.01)	(0.32)
RESTRUCTURE	0.0000	0.0009	−0.0027	−0.0032	−0.0030	0.2740	0.0015
	(0.99)	(0.86)	(0.29)	(0.42)	(0.35)	(0.00)	(0.00)
LOSS	−0.0103	−0.0066	0.0136	0.0231	−0.0381	0.4851	0.0083
	(0.01)	(0.29)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LOG_AGE	0.0028	0.0048	−0.0070	−0.0094	0.0084	−0.0019	−0.0007
	(0.13)	(0.09)	(0.00)	(0.00)	(0.00)	(0.95)	(0.00)
Observations Used	2,063	2,063	2,063	2,063	2,455	2,465	2,465
Adjusted R^2	1.17%	0.16%	8.58%	5.81%	17.59%	7.51%	30.67%

The table compares implied cost of capital estimates as of June 2004 for a sample of 2,515 firms that filed first-time Section 404 opinions during the November 2004 to January 2006 period. Of the 2,515 firms, 346 filed adverse reports (ICW firms) and 2,169 filed clean reports (control firms). For discretionary accrual measures (*PIN*) the number of firms in ICW/control samples is 290/1,815 (346/2,159), respectively. The risk attributes are defined as: *DACC* is discretionary accruals, estimated as a residual from a cross-sectional regression run for each two-digit SIC industry $ACC_i = \beta_0 + \beta_1 * 1/TA_i + \beta_2 * (\Delta SALES_i - \Delta AR_i) + \beta_3 * PPE_i + \varepsilon_i$, where *ACC* is total accruals estimated as income before extraordinary items (Compustat item #123) minus cash flow from operations (Compustat item #308); *ΔSales* is change in sales (Compustat item #12); *ΔAR* is change in accounts receivable (Compustat item #2); and *PPE* is property, plant, and equipment (Compustat item #7). All variables are scaled by beginning-of-period total assets. A minimum of ten observations is required for each regression and observations with an absolute value of scaled accruals greater than 1 are excluded from the analysis. *PM_DACC* is performance-matched discretionary accruals, based on the Kothari et al. (2005) model, and is calculated as *DACC* for the sample firm minus *DACC* for the matched control firm, where the matched control firm has the closest ROA within the same two-digit SIC industry. *A_DACC* and *APM_DACC* are absolute values of *DACC* and *PM_DACC*, respectively. *PIN* is the probability of informed trading, estimated using trading information from the TAQ 2004 dataset. The method for estimation is described in Easley et al. (2001). *BETA* is the CAPM beta, estimated as a slope from regressing monthly excess stock return on monthly excess market return, using 12 months of returns prior to June 2004. *RETVAR* is the variance of residuals from a regression of monthly stock excess returns on the market excess return and two Fama and French (1996) factor-mimicking portfolio returns over the 12 months prior to June 2004. Panel A contains univariate comparisons of means and medians. Observations with values falling into the top and bottom extreme percentiles of the respective variable are deleted. "Observations Used" indicates the size of the sample after truncation. Two-sided p-values for comparisons with control sample are reported in parentheses: p-values for mean comparisons are based on t-statistics, and p-values for median comparisons are based on a Wilcoxon signed rank test.

Panel B reports results for Regression (4):

$$\begin{aligned} RISK\text{-}FACTOR_i = {} & \gamma + \gamma_0 * WEAK_i + \gamma_1 * LOG\_SEGMENTS_i + \gamma_2 * FOREIGN_i + \gamma_3 * M\&A_i + \gamma_4 * RESTRUCTURE_i + \gamma_5 * SALEGRW_i + \gamma_6 * INVENTORY_i \\ & + \gamma_7 * LOG\_MKTV_i + \gamma_8 * LOSS_i + \gamma_9 * RZSCORE_i + \gamma_{10} * LOG\_AGE_i + \varepsilon_i. \end{aligned}$$

The seven risk attributes are defined above. *WEAK* is an indicator variable that takes on a value of 1 if the firm discloses an ICW, and 0 otherwise. All control variables are as defined in Table 1.

Two-sided p-values are reported in parentheses. To avoid spurious effects due to outliers, we exclude all observations within the top and bottom 1 percent of studentized residuals.

there is no *direct* association between ICW and accounting quality. This result implies that while ICWs may increase accounting risk, i.e., the likelihood of significant accounting quality problems in the future, there is no evidence of already-realized poorer earnings quality (as measured by our discretionary accruals' proxies) associated with ICWs reported under Section 404.[14] We also find that *WEAK* is insignificant in regressions with *PIN* and *BETA* as dependent variables. These results suggest that risk drivers identified by theory as being affected by information risk (accounting quality) are not directly associated with ICW reported under Section 404. Only idiosyncratic volatility is still positively associated with ICW after controlling for firm characteristics. However, it is debatable whether idiosyncratic volatility is systematic and hence priced in the firms' cost of equity.

Overall, we find little evidence that various risk attributes that are theoretically expected to be associated with ICW are different between our ICW and control firms after controlling for primitive firm characteristics. Thus, our risk attribute results largely corroborate our primary findings relating to implied cost of equity.

Exploring the Different Value Line Results

We generally find no difference in cost of equity between ICW and control firms, with the exception of VL, which is significantly higher for ICW firms than for control firms (as of June 2004) even after controlling for firm characteristics and analyst forecast bias. The 2004 VL results contrast with those using all other cost-of-equity proxies. However, these results are consistent with those reported by Ashbaugh-Skaife et al. (2006), who find higher VL for firms reporting internal control deficiencies under Sections 302 and 404. In this section, we explore the reasons for the differential results arising between the Value Line and other proxies for cost of equity.

Ashbaugh-Skaife et al. (2006) justify their choice of VL by noting that (1) VL is a "valid" measure of cost of equity since it satisfies the rational expectations tests of Guay et al. (2005), and (2) the VL sample does not suffer from the potentially serious sample selection bias that samples using other measures (such as PEG) have because they require positive and/or increasing earnings forecasts. Accordingly, we focus our inquiry on comparing the VL and other measures with respect to both their construct validity and sampling biases.

For justifying construct validity, Ashbaugh-Skaife et al. (2006) verify that VL meets the rational expectations requirements of Guay et al. (2005). However, Guay et al. report that a number of other measures, such as CT and GLS (and under certain conditions, PEG and GM), also satisfy the rational expectations requirements in terms of positive correlation with future stock returns. It is important to note that these measures show a positive correlation with future stock returns only after adjusting for analyst forecast bias and forecast sluggishness, adjustments that we (or Ashbaugh-Skaife et al. 2006) do not make in our analyses. In the absence of these adjustments, VL is negatively correlated with future returns, as we show in Table 4. Additionally, VL fails the measurement error tests of Easton and Monahan (2005). Therefore, we maintain that the VL results are unreliable because the VL measure lacks construct validity.

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[14] Our results relating to discretionary accruals are inconsistent with those reported by Doyle et al. (2007b) who do find evidence of greater accruals' management for ICW firms. However, this inconsistency stems from the difference between their sample of material weaknesses reported under Sections 302 and 404 and our restricted sample of ICW reported only under Section 404. We replicate our analyses using Doyle et al.'s (2007b) expanded sample and find that unsigned discretionary accruals for ICW firms are higher than for the control sample even after controlling for primitive firm characteristics. We thank Sarah McVay for providing data on their sample of Section 302 material weakness disclosures.

We next examine the issue of sampling bias. Most implied-cost-of-equity measures require positive or increasing earnings forecasts. This requirement potentially biases the sample against firms that are distressed or experiencing poor earnings performance. As Ashbaugh-Skaife et al. (2006) note, such sampling bias can be particularly important in our context because ICW has been shown to be associated with poor performance (Ashbaugh-Skaife et al. 2007; Doyle et al. 2007a). Such a researcher-imposed sampling requirement is not necessary for the VL measure since the VL database provides expected rates of returns for all firms included in their database. However, as we note earlier, VL has severely restricted coverage compared to I/B/E/S. Therefore, it is possible that VL may also have potentially serious sample selection problems that arise because of VL's limited coverage.

To compare potential biases in the VL and PEG samples (we choose PEG since it has the largest coverage among all measures), we conduct the following analysis. We identify two subsamples: (1) The VL Bias sample, which comprises the 1,320 firms for which the PEG measure can be estimated but VL data are missing; and (2) the PEG Bias sample, which comprises the 58 firms for which VL data are available but the PEG cannot be estimated. Next we compare mean and median values for various firm characteristics across the two subsamples, which are reported in Table 6.

At the outset, we find that the VL sample excludes 242 ICW firms (18.3 percent) while the PEG sample excludes only one ICW firm (1.7 percent), suggesting that it is the VL sample that is significantly more biased against ICW firms. In addition, our results suggest that it is the VL sample, rather than the PEG sample, that is more likely to exclude distressed firms. For example, firms not included in the VL sample have significantly higher bankruptcy probability rank and much higher incidence of losses than those excluded from the PEG sample. Overall, there is no evidence suggesting that the PEG sample is relatively more biased than the VL sample in terms of excluding distressed and/or poorly performing firms.[15]

Table 6 also identifies other significant biases in the VL sample. The firms that VL excludes vis-à-vis those that PEG excludes are significantly smaller, less diversified, younger, and more likely to be from high-tech industries. Also, the VL sample appears to exclude riskier firms—in terms of beta, return volatility, and *PIN*—although the VL Bias sample firms have lower book-to-market ratios (probably because of greater high-tech concentration).

Finally, to determine the effect of sampling bias on our results, we examine differences in PEG between ICW and control samples for firms included in the VL sample (not tabulated). We obtain 1,049 firms from the VL sample with data necessary for PEG estimation. We find that PEG is significantly higher for ICW firms than for control firms even after controls, although the magnitude of the difference (53 basis points) is much lower than that using VL (208 basis points). This suggests that at least part of the VL results is attributable to sampling bias, although measurement differences also appear to be important.

In summary, we find that (1) the VL measure performs poorly in construct validity tests and (2) the VL sample appears to have significant biases. Also, the VL results are inconsistent across the two periods of analyses (June 2004 and June 2006). For these reasons, we do not believe that the June 2004 VL results significantly detract from our

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[15] We also perform similar analyses comparing the CT sample to the VL sample. We find qualitatively and statistically identical results to those comparing the PEG and VL samples, i.e., the VL sample excludes a higher proportion of distressed and ICW firms than the CT sample.

TABLE 6
Comparing Sample Biases in the Value Line and PEG Samples: June 2004

	Means				Medians			
	VL Bias Sample	PEG Bias Sample	Difference: VL Bias − PEG Bias		VL Bias Sample	PEG Bias Sample	Difference: VL Bias − PEG Bias	
RZSCORE	5.937	5.172	0.765	(0.04)	6.000	5.000	1.000	(0.03)
LOSS	0.355	0.069	0.286	(0.00)	—	—	—	—
MKTV	942	8126	−7184	(0.00)	413	3513	−3100	(0.00)
BMRATIO	0.466	0.611	−0.145	(0.00)	0.433	0.570	−0.136	(0.00)
SEGMENTS	1.792	2.466	−0.673	(0.00)	1.000	2.000	−1.000	(0.00)
FOREIGN	0.161	0.310	−0.149	(0.00)	—	—	—	—
AGE	11.227	34.310	−23.084	(0.00)	8.000	32.000	−24.000	(0.00)
HIGHTECH	0.336	0.069	0.267	(0.00)	—	—	—	—
BETA	1.369	0.941	0.428	(0.03)	1.192	0.869	0.323	(0.03)
RETVAR	0.010	0.003	0.007	(0.00)	0.006	0.002	0.004	(0.00)
PIN	0.141	0.115	0.026	(0.02)	0.138	0.108	0.030	(0.01)
%ICW	0.183	0.017	0.166	(0.00)	—	—	—	—

The table compares a sample of 1,320 firms with available *R_PEG* estimates and missing *R_VL* estimates (VL Bias sample) to a sample of 58 firms with missing *R_PEG* estimates and available *R_VL* estimates (PEG Bias sample) from an original sample of 2,515 firms that filed first-time Section 404 opinions during the November 2004 to January 2006 period.

Two-sided p-values for comparisons with the control sample are reported in parentheses: p-values for mean comparisons are based on t-statistics, and p-values for median comparisons are based on a Wilcoxon signed rank test. Univariate statistics for continuous variables are reported after observations falling into top and bottom extreme percentiles are truncated.

(*continued on next page*)

TABLE 6 (continued)

Variable Definitions:
RZSCORE = decreasing decile rank of Altman's (1968) Z-Score (computed as decile rank of Z-score times −1 and plus 10);
LOSS = an indicator variable equal to 1 if earnings before extraordinary items (Compustat item #18) in 2002 and 2003 sum to less than 0;
MKTV = market value of equity, where market value of equity is equal to price per share multiplied by the number of shares outstanding in I/B/E/S as of the end of June 2004;
BMRATIO = the ratio of book value of equity to the market value of equity, where book value is the stockholders' book equity plus deferred taxes minus the book value of preferred stock, and market value of equity is defined as previously;
SEGMENTS = number of business segments reported in 2004 Compustat Segment file for fiscal 2003;
FOREIGN = an indicator variable equal to 1 if the firm has a non-zero foreign currency translation (Compustat item #150) in fiscal 2003;
AGE = number of years the firm exists in the CRSP database;
HITECH = an indicator variable equal to 1 if a firm belongs to a high-tech industry according to the Francis et al. (1994) classification;
BETA = CAPM beta estimated as a slope from regressing monthly excess stock return on monthly excess market return, using the 12 months of returns prior to June 2004;
RETVAR = the variance of residuals from regressing monthly stock excess returns on the market excess return and two Fama and French (1996) factor-mimicking portfolio returns over the 12 months prior to June 2004;
PIN = probability of informed trading, estimated using trading information from the TAQ 2004 dataset; and
%ICW = percentage of ICW firms.

primary inference that there are no cost-of-equity differences between ICW and control firms.

VI. CONCLUSION

We investigate whether firms reporting first-time internal control weaknesses (ICWs) over financial reporting under Section 404 of SOX, on average, have higher implied cost of equity compared to a control sample of firms that file clean reports. We find that ICW firms have higher implied cost of equity than firms without such weaknesses. However, we find no significant association between ICW and cost of equity after controlling for analyst forecast bias and primitive firm characteristics associated with ICW, suggesting that there is unlikely any *direct* relation between ICW and cost of equity. Our results are robust to using several alternative proxies for implied cost of equity and variations in sample and time period of analysis. We also find qualitatively similar results with respect to various risk attributes that are theoretically related to information risk. Finally, we are unable to find significantly higher cost of equity (after controls) associated even with egregious types of ICW.

Our results suggest that there are unlikely any cost-of-equity effects associated with firms reporting ICW under Section 404. These results question an important benefit of ICW disclosures claimed by proponents of the Section 404 disclosures, i.e., reduced cost of capital. Our paper therefore makes an important contribution to the debate regarding the costs and benefits of the internal control stipulations under SOX by questioning their cost-benefit trade-offs.

We acknowledge the following caveats. First, cost of equity is a challenging concept to measure. We base our primary analyses on implied cost of equity because it does not suffer from the problems involved in computing expected rates of return through factor loadings (Fama and French 1997). However, there are serious measurement problems associated with estimating implied cost of equity at the firm level (Easton and Monahan 2005). By using several alternative proxies, controlling for forecast bias, conducting tests of construct validity, and reporting corroborating evidence with risk attributes that are theoretically associated with information risk, we significantly minimize the likelihood that our results are an artifact of measurement error in our cost-of-equity proxies.

Second, our sample suffers from large-firm bias that arises both because smaller firms are exempt from the accelerated filing requirements of Section 404 and because of our data requirements (our sample firms must be covered in the I/B/E/S database). Therefore, our inferences may not apply to the smallest firms in the economy, where some of the strongest effects of weak internal controls are likely to occur.

Third, our study focuses on a sample of firms reporting under Section 404 for the first time. Doyle et al. (2007b) conjecture that ICW disclosures under Section 404 may be subject to lower materiality thresholds by auditors, thereby reducing the power of adverse Section 404 reports to detect the firms with the most egregious internal control problems. This may reduce the power of our tests to more generally identify cost-of-equity effects of internal control weaknesses.

Finally, all of the tests conducted in the paper are cross-sectional. Hence, any economy-wide effects of SOX will go undetected. In particular, SOX requires firms to provide assurances about their internal controls on a going-forward basis. This is equivalent to an exogenous pre-commitment to disclose, which may cause firms to change their behavior. For example, managers may realize that capital market participants will be better informed, which implies that management will be held more accountable for their actions; hence, managers may choose to improve internal controls. This, in turn, may potentially reduce the expected rate of return for all firms if some of the theories we discuss are descriptive.

APPENDIX A
ALTERNATIVE PROXIES FOR COST OF EQUITY

Depending on the particular model for cost of capital estimation, we need up to five years of EPS forecasts. We use median consensus forecasts to proxy for the market's future earnings expectations and require that each observation have non-missing one- and two-year-ahead consensus earnings forecasts (*FEPS1* and *FEPS2*). We use three-, four-, and five-year-ahead forecasts for future earnings per share, if they are available in I/B/E/S. Otherwise, we estimate the corresponding forecasted values by applying the long-term growth rate to *FEPS2*. We use stock price per share and forecasts of EPS and long-term earnings growth from the I/B/E/S summary tape as of June 17, 2004 (June 15, 2006 for supplementary analysis). Book value of equity and the dividend payout ratio for the latest fiscal year-end prior to June 2004 (prior to June 2006 for supplementary analysis) are obtained from the Compustat annual database. Following prior research, we assume a constant dividend payout ratio throughout the forecast period. The following data restrictions are imposed when estimating each cost-of-equity measure: positive book value of equity for Gebhardt, Lee, and Swaminathan (GLS) and Claus and Thomas (CT) methods; $FEPS1 > 0$ for Modified Ohlson and Juettner-Nauroth (OJ), Gode and Mohanram (GM), and Simultaneous Estimation of Cost of Equity and Growth Rates (EAST) methods; $FEPS2 > FEPS1$ for Price-Earnings-Growth (*PEG*), GM, and EAST methods.

Gebhardt, Lee, and Swaminathan Method (GLS)

Gebhardt et al. (2001) use the following model to estimate the cost of equity:

$$P_t = B_t + \frac{FROE_{t+1} - r_e}{(1 + r_e)} B_t + \frac{FROE_{t+2} - r_e}{(1 + r_e)^2} B_{t+1} + TV,$$

where P_t = stock price; B_t = book value of equity per share; B_{t+i} = future book value of equity estimated using a clean surplus assumption ($B_{t+i} = B_{t+i-1} - k{*}FEPS_{t+i} + FEPS_{t+i}$, where k is the dividend payout ratio and *FEPS* is the earnings per share forecast); $FROE_{t+i}$ = future return on equity forecast; TV = terminal value, which is equal to $\sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_e}{(1 + r_e)^i} B_{t+i-1} + \frac{FROE_{t+T} - r_e}{r_e(1 + r_e)^{T-1}} B_{t+T-1}$ with $T = 12$; and r_e = cost-of-equity capital. For the first three years, future ROE is estimated as $FROE_{t+i} = FEPS_{t+i}/B_{t+i-1}$. Beyond the third year until year 12, FROE is computed by linear interpolation to the industry median ROE.[16] The cost of equity is calculated numerically employing the Newton-Raphson method. We put the initial value of the cost of equity equal to 9 percent in the first iteration; the algorithm is considered to converge if the price of a stock obtained from the implied cost of equity deviates from the actual stock price by no more than \$0.005.[17] We label this measure GLS.

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[16] We estimate industry median ROEs over the ten years preceding the cost of capital estimation using all available Compustat annual observations with positive book values of equity and non-negative earnings, where the 48 industries are defined according to the Fama and French (1997) classification.

[17] Botosan and Plumlee (2005) use a similar convergence criterion. We replicate estimation procedures using alternative initial values and obtain similar results.

Claus and Thomas Method (CT)

A method proposed by Claus and Thomas (2001) is different from Gebhardt et al. (2001) in terms of the perpetual growth assumption in estimating terminal value. Specifically, the method implies that the value of a firm can be expressed as:

$$P_t = B_t + \sum_{t=1}^{5} \frac{FEPS_{t+i} - r_e B_t}{(1 + r_e)^i} + \frac{(FEPS_{t+5} - r_e B_{t+4})(1 + g)}{(r_e - g)(1 + r_e)^5},$$

where $FEPS$ is future earnings per share, B is book value per share, as previously defined, g is the growth rate of residual earnings in perpetuity equal to the expected inflation rate (risk-free rate minus 3 percent), and r_e is the cost-of-equity capital. The implied cost of equity is estimated using a recursive algorithm, as described earlier. We label this measure CT.

Gode and Mohanram Method (GM)

The Gode and Mohanram (2003) method is based on the Ohlson and Juettner-Nauroth (2005) model of EPS and EPS growth, which equates the value of a firm with the capitalized next-period EPS and the future "abnormal" growth in EPS. Several prior studies derive empirical measures for cost of capital by imposing various restrictions on this basic model. Gode and Mohanram (2003) represent the value of the firm as:

$$P_t = \frac{FEPS_{t+1}}{r_e} + \frac{(FEPS_{t+2} - FEPS_{t+1} - r_e(FEPS_{t+1} - k^*FEPS_{t+1})}{r_e(r_e - g)},$$

where $FEPS$ is future earnings per share, k is the dividend payout ratio, as defined previously, g is the long-term growth in abnormal earnings changes, and r_e is the cost-of-equity capital. Gode and Mohanram (2003) show that this model specification provides an analytical solution for the cost of equity. The following expression describes the solution:

$$R\_GM = A + \sqrt{A^2 + \frac{FEPS_1}{P_0}(g_2 - (\gamma - 1))},$$

where:

$$A = \frac{1}{2}\left((\gamma + 1) + \frac{k^*FEPS_1}{P_0}\right);$$

$$g_2 = \frac{(FEPS_2 - FEPS_1)}{FEPS_1}.$$

Gode and Mohanram (2003) estimate γ (the long-term growth in abnormal earnings changes) as the real risk-free rate: $\gamma - 1 = R_f - 3\%$. We use the ten-year T-bond rate at the date of estimation to proxy for the risk-free rate. This measure is labeled GM.

Price-Earnings Growth Method (PEG)

Easton (2004) derives a restricted version of Gode and Mohanram (2003) model. He shows that under the assumption of zero dividends and zero growth in abnormal earnings changes, the firm's cost of equity is obtained from the following expression:

$$P_t = \frac{E_t[FEPS_{t+2} - FEPS_{t+1}]}{(r_e)^2},$$

where *FEPS* is future earnings per share forecast, as defined previously, and r_e is the cost-of-equity capital. From the above expression, the cost of capital is proportional to the inverse of the PEG ratio:

$$R\_PEG = \sqrt{\frac{FEPS_2 - FEPS_1}{P_0}}.$$

The cost of capital estimated by the Easton (2004) PEG specification is labeled PEG.

Modified Ohlson and Juettner-Nauroth Method (OJ)

We derive an additional specification from the Ohlson and Juettner-Nauroth (2005) model. While Gode and Monahan (2003) use the growth in earnings from period t to $t + 1$ to derive short-term earnings growth estimates, we use all the information in analysts' earnings forecasts including long-term growth forecasts.

We begin by describing the value of a firm's equity as in Ohlson and Juettner-Nauroth (2005):

$$P_t = \frac{FEPS_{t+1}}{r_e} + \sum_{i=1}^{\infty} \frac{1/r_e(FEPS_{t+i+1} + r_e{*}DIV_{t+i} - R{*}FEPS_{t+i})}{R^i},$$

where *FEPS* is expected earnings per share, *DIV* is expected dividends per share, and *R* is cost-of-equity capital + 1 $(1 + r_e)$.

After expanding the valuation formula to include explicit forecasts for periods one to three and the terminal value, we obtain:

$$P_t = \frac{FEPS_{t+1}}{r_e} + \frac{z_{t+1}}{R} + \frac{z_{t+2}}{R^2} + \frac{z_{t+3}}{R^3} + \sum_{i=4}^{\infty} \frac{z_{t+i}}{R^i}$$

$$z_{t+i} \equiv 1/r_e(FEPS_{t+i+1} + r_e{*}DIV_{t+i} - R{*}FEPS_{t+i}).$$

Next, as in Ohlson and Juettner-Nauroth (2005) and Gode and Mohanram (2003) we make the assumption of a constant growth rate for z in the terminal period:

$$z_{t+i} \equiv \gamma{*}z_t,$$

where $\gamma > 1$.

If we define $\xi_{t+i} \equiv \frac{z_{t+i}}{R^i}$, then we get the following earnings change dynamics:

$$\xi_{t+i} \equiv \frac{\gamma}{R}{*}\xi_t.$$

Using the simplified notation, the terminal sum can be re-written as:

$$\begin{aligned}
&\xi_{t+4} + \frac{\gamma}{R}*\xi_{t+4} + \frac{\gamma^2}{R^2}*\xi_{t+4} + \frac{\gamma^3}{R^3}*\xi_{t+4} + \frac{\gamma^4}{R^4}*\xi_{t+4} + \dots\\
&= \xi_{t+4}\left[1 + \frac{\gamma}{R} + \frac{\gamma^2}{R^2} + \frac{\gamma^3}{R^3} + \frac{\gamma^4}{R^4} + \dots\right]\\
&= \xi_{t+4}\left[\frac{R}{R-\gamma}\right].
\end{aligned}$$

Therefore, the entire valuation expression can be written as:

$$\begin{aligned}
P_t &= \frac{FEPS_{t+1}}{r_e} + \frac{z_{t+1}}{R} + \frac{z_{t+2}}{R^2} + \frac{z_{t+3}}{R^3} + \frac{z_{t+4}}{R^4}\left[\frac{R}{R-\gamma}\right]\\
&= \frac{FEPS_{t+1}}{r_e} + \frac{z_{t+1}}{R} + \frac{z_{t+2}}{R^2} + \frac{z_{t+3}}{R^3} + \frac{z_{t+4}}{R^3(R-\gamma)}.
\end{aligned}$$

We operationalize the above expression in the following manner:

$$P_t = \frac{FEPS_{t+1}}{r_e} + \frac{z_{t+1}}{(1+r_e)} + \frac{z_{t+2}}{(1+r_e)^2} + \frac{z_{t+3}}{(1+r_e)^3} + \frac{z_{t+4}}{(1+r_e)^3(r_e-g)}$$

and

$$z_{t+i} \equiv 1/r_e(FEPS_{t+i+1} + r_e{*}kFEPS_{t+i} - (1+r_e){*}FEPS_{t+i}),$$

where *FEPS* is the forecasted future earnings per share, k is the dividend payout ratio, defined as previously, and r_e is the cost-of-equity capital. The long-term growth rate (g) is set equal to the inflation rate, which we estimate as the risk-free rate minus 3 percent. We use the iterative procedure described earlier to obtain a numeric estimate for the implied cost of capital from the above model. We label this measure OJ.

Value Line Expected Return (VL)

We use average annual total expected return rates from the Value Line historical estimates file computed using forecasts issued in the second calendar quarter of 2004 (second calendar quarter of 2006 for our supplementary analysis).[18]

Simultaneous Estimation of Cost of Equity and Growth Rates (EAST)

To simultaneously estimate cost of equity and earnings growth rates for individual firms, we augment the simultaneous estimation of cost of equity and growth rate developed in Easton (2004) by the random sampling procedure and fixed effects regression.

The original Easton (2004) estimation is based on the Ohlson and Juettner-Nauroth (2005) model:

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[18] According to the Value Line data manual, these total expected return rates are estimated using projected three- to five-year-ahead stock appreciation and dividend forecasts issued by the Value Line analysts. Projected stock appreciation is derived based on the current stock price and the projected stock price target. The latter value is based on Value Line's estimated earnings per share three to five years out multiplied by the expected price-earnings ratio in the same period. The width of the price range is based on the standard deviation of historic weekly percent price change.

$$P_t = \frac{FEPS_{t+1}}{r_e} + \sum_{i=1}^{\infty} \frac{1/r_e(FEPS_{t+i+1} + r_e{*}DIV_{t+i} - R{*}FEPS_{t+i})}{R^i}.$$

Assuming that the term under the sum grows in perpetuity at the rate equal to Δagr, the valuation formula becomes:

$$P_t = \frac{FEPS_{t+1}}{r_e} + \frac{(FEPS_{t+2} + r_e{*}DIV_{t+1} - (1 + r_e){*}FEPS_{t+1})}{r_e(r_e - \Delta agr)}.$$

After rearranging the terms, the latter equality can be re-written as:

$$\frac{FEPS_{t+2} + r_e{*}DIV_{t+1}}{P_t} = r_e(r_e - \Delta agr) + (1 + \Delta agr)\frac{FEPS_{t+1}}{P_t},$$

or, defining $CEPS_{t+2} \equiv FEPS_{t+2} + r_e{*}DIV_{t+1}$, $\gamma_0 \equiv r_e(r_e - \Delta agr)$ and $\gamma_1 \equiv (1 + \Delta agr)$, as:

$$\frac{CEPS_{t+2}}{P_t} = \gamma_0 + \gamma_1 \frac{FEPS_{t+1}}{P_t}.$$

For the portfolio of firms, where i denotes a firm subscript, the average cost of equity and average growth rate can therefore be estimated from the intercept and the slope of a linear regression:

$$\frac{CEPS^i_{t+2}}{P^i_t} = \gamma_0 + \gamma_1 \frac{FEPS^i_{t+1}}{P^i_t} + e^i_t.^{19}$$

This method provides average estimates of cost of equity and earnings growth for a portfolio of firms. In the context of comparing cost of equity values for the two groups of firms, this poses two problems: (1) it is difficult to assess statistical significance of the difference in cost of equity between the two groups of firms; and (2) it is impossible to control for firm-specific characteristics. Accordingly, we develop a bootstrapping procedure that allows us to determine firm-specific cost of equity using the Easton (2004) methodology.

First, we randomly select 500 firms out of our full sample of firms with $FEPS_{t+1} > 0$ and $FEPS_{t+2} > FEPS_{t+1}$ and estimate the average cost of equity for this randomly selected portfolio using Easton's method above. We replicate this random sampling procedure 5,000 times (with replacement). The resulting average cost of equity for each portfolio can be represented by the column vector $[\bar{r}_1, \bar{r}_2, \bar{r}_3, \bar{r}_4, \bar{r}_5, \ldots, \bar{r}_{5000}]$. Given that each resulting rate of return $\bar{r}_j$ is the average cost of equity for firms randomly drawn in iteration j, the

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[19] The estimation is performed using numerical methods since the dependent variable requires prior knowledge of the rate of return. The estimation procedure starts with assuming a rate of return of 10 percent. Then the slope (γ_1) and intercept (γ_0) of the linear regression are estimated. The implied growth rate (Δagr) is calculated as ($\gamma_1 - 1$) and the rate of return (r_e) is calculated as $\frac{\Delta agr + \sqrt{\Delta agr^2 + 4\gamma_0}}{2}$. The obtained rate of return is used to recalculate the dependent variable and the regression is re-estimated. The iterations continue until convergence (no change in r_e) is satisfied.

following relation between portfolio rates of return and individual stock returns needs to hold for each portfolio j:

$$\bar{r}_j = \frac{\sum_{1}^{N} r^{i*} s_j^i}{500},$$

where r^i is the cost of equity for stock i, s_j^i is an indicator variable equal to 1 if stock i is included in iteration j, and N is the total number of stocks in the population used for random sampling.

Therefore, the relationship between portfolio returns and individual firm returns can be represented in the form $Y = X\beta$ as:

$$\begin{bmatrix} \bar{r}_1 \\ \bar{r}_2 \\ \cdot \\ \cdot \\ \bar{r}_{5000} \end{bmatrix} = \begin{bmatrix} s_1^1 & s_1^2 & s_1^3 & s_1^4 & \cdot & s_1^N \\ s_2^1 & s_2^2 & s_2^3 & s_2^4 & \cdot & s_2^N \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ s_{5000}^1 & s_{5000}^2 & s_{5000}^3 & s_{5000}^4 & \cdot & s_{5000}^N \end{bmatrix} \begin{bmatrix} r^1 \\ r^2 \\ \cdot \\ \cdot \\ r^N \end{bmatrix} \times \frac{1}{500}.$$

The above representation is equivalent to a fixed-effects model with no additional independent variables. The vector of individual-firm cost of equity can be estimated by OLS regression where the average portfolio return is the dependent variable, and N indicators are independent variables.

In unreported analyses we compare the mean cost of equity obtained using the above procedure for internal control weakness (ICW) and control firms, with those obtained by estimating the Easton (2004) method separately for the ICW and control subsamples. We find that the average cost of equity using our bootstrapping procedure (cost of equity directly applying Easton's method) for the 295 ICW firms and 1,911 control firms are 0.1105 (0.1147) and 0.1056 (0.1044), respectively.[20] This suggests that our procedure estimates the average cost of equity for the ICW and control firms with significant accuracy.

APPENDIX B
PREDICTED FORECAST ERRORS

Predicted forecast errors are estimated using Liu and Su (2005). The model includes variables known to be associated with systematic biases in analyst forecasts: variables related to underreaction to past information, namely, (1) past earnings surprise, (2) stock returns, and (3) recent analyst earnings forecast revisions, and variables related to overreaction to past information, namely, (4) book-to-market ratio, (5) forward earnings-to-price ratio, (6) long-term growth forecast, (7) past sales growth, (8) investments in property, plant, and equipment, (9) investment in other long-lived assets, and (10) the accrual component of earnings. We also add a variable measuring the horizon of the forecast since it is has been shown that analysts are progressively less optimistic as they get closer to the annual earnings announcements (Richardson et al. 2004). The underreaction variables are expected to have negative predictive coefficients, and the overreaction variables are expected to have positive predictive coefficients.

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[20] Note that these numbers differ from those in Table 2, because the results reported in Table 2 are after truncation of outliers.

The model is estimated on a pooled sample with either one-year- or two-year-ahead forecast errors as dependent variables:

$$\begin{aligned} FERR1_i = {} & \beta_0 + \beta_1{*}GRW\_SALES_i + \beta_2{*}ACC_i + \beta_3{*}\Delta PPE_i + \beta_4{*}\Delta OLTA_i \\ & + \beta_5{*}LTG_i + \beta_6{*}BMRATIO_i + \beta_7{*}FE\_P_i + \beta_8{*}REV1_i + \beta_9{*}QFERR_i \\ & + \beta_{10}{*}RETURN_i + \beta_{11}{*}HORIZ1_i + \varepsilon_i; \end{aligned}$$

$$\begin{aligned} FERR2_i = {} & \gamma_0 + \gamma_1{*}GRW\_SALES_i + \gamma_2{*}ACC_i + \gamma_3{*}\Delta PPE_i + \gamma_4{*}\Delta OLTA_i \\ & + \gamma_5{*}LTG_i + \gamma_6{*}BMRATIO_i + \gamma_7{*}FE\_P_i + \gamma_8{*}REV2_i \\ & + \gamma_9{*}QFERR_i + \gamma_{10}{*}RETURN_i + \gamma_{11}{*}HORIZ2_i + \eta_i; \end{aligned}$$

where:

FERR1, *FERR2* = analyst forecast error, estimated as actual I/B/E/S EPS minus either one- or two-year-ahead consensus (median) EPS forecast issued in June of Year $t + 1$ ("forecast date"), scaled by stock price on the "forecast date";
GRW_SALES = percent growth in sales (Compustat item #12) from Year $t - 5$ to Year *t*; where Year *t* is the most recent fiscal year ended before the "forecast date";
ACC = total accruals for Year *t* estimated using balance-sheet method,[21] scaled by beginning-of-year total assets;
ΔPPE = change in property, plant, and equipment (Compustat item #7) over Year *t* scaled by beginning-of-year total assets;
$\Delta OLTA$ = change in other long-term assets[22] over Year *t* scaled by beginning-of-year total assets;
LTG = median long-term growth in earnings forecast on the "forecast date";
BMRATIO = book-to-market ratio;
FE_P = forward earnings-to-price ratio (one-year-ahead median EPS forecast issued on the "forecast date," divided by stock price on the "forecast date");
REV1, *REV2* = revision in one- or two-year-ahead consensus forecast over the three months prior to "forecast date," scaled by stock price on the "forecast date";
QFERR = error in the most recent quarterly EPS forecast prior to the "forecast date";
RETURN = stock return over the 12 months prior to the "forecast date"; and
HORIZ1, *HORIZ2* = days remaining before the end of the fiscal year for which the one- or two-year-ahead forecast is made calculated on the "forecast date."

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[21] Operating Accruals are estimated as change in current assets (Compustat item #4) – change in cash (Compustat item #11) – change in current liabilities (Compustat item #5) + change in current portion of long-term debt (Compustat item #34) – depreciation (Compustat item #14).

[22] Calculated as change in total assets (Compustat item #6) minus change in current assets (Compustat item #4) minus change in PPE (Compustat item #7).

We estimate the above model separately for the pooled sample using all available forecasts made in 1999–2003 (1998–2002) for the one- (two-) year-ahead forecast error prediction. Our estimation sample comprises 16,321 (13,088) firm-years for the one- (two-) year-ahead forecast error prediction model, respectively. We compute predicted one- and two-year-ahead forecast errors for forecasts made in June 2004 (i.e., forecasts used in our cost of equity calculations). Specifically, we apply coefficients of the model estimated for the pooled holdout sample to the values of predictive variables as of June 2004 for each individual firm in our sample. The estimated errors have significant predictive power for our sample firms. The correlation of the estimated predicted forecast error *PRED_FERR1* with the realized one-year-ahead forecast error is 0.25 (0.15) for a Pearson (Spearman) test, significant at the 0.01 level. The two predicted errors are highly correlated with each other—the Pearson (Spearman) correlation coefficient is equal to 0.70 (0.69). Accordingly, to avoid multicollinearity problems when using both *PRED_FERR1* and *PRED_FERR2* in OLS regressions, we use the simple average of *PRED_FERR1* and *PRED_FERR2* in our tests.

In our Value Line cost of equity analyses, we estimate one-year-ahead predicted forecast error by substituting I/B/E/S forecasts with Value Line forecasts.[23] Accordingly, the "forecast dates," realized EPS, and prices are also taken from the Value Line historical estimates file.

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Private Earnings Guidance and Its Implications for Disclosure Regulation

Isabel Yanyan Wang
Michigan State University

ABSTRACT: This study investigates three related questions: (1) Why did some firms provide private earnings guidance to analysts before Regulation Fair Disclosure? (2) How did the exogenous shock of Regulation Fair Disclosure affect these firms' disclosure policies? (3) What are the economic consequences of this disclosure regulation? To address these questions, I develop a new measure of private earnings guidance.

Consistent with theory, I find that firms were more likely to provide private earnings guidance if they had higher proprietary information costs, and if their earnings were more predictive of other firms' earnings. Policymakers enacted Regulation Fair Disclosure to stop private earnings guidance, but they also intended for managers to replace private earnings guidance with public earnings guidance, thereby improving the information environment. However, I find that roughly half of the firms that I classify as relying more on private earnings guidance replace private earnings guidance with nondisclosure instead of public earnings guidance, and as a result, these firms suffer significant deterioration in their information environments. Consistent with theory, firms are more likely to replace private earnings guidance with nondisclosure if they have lower information asymmetry and higher proprietary information costs. On the other hand, firms that replace private earnings guidance with public earnings guidance, on average, prevent significant deterioration in their information environments. Evidence that firms respond to disclosure regulation as predicted by theory can help policymakers anticipate which firms' information environments are likely to be adversely affected by new disclosure regulations.

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Data Availability: *All data are publicly available from sources identified in the text.*

I. INTRODUCTION

This study develops a new measure of the extent to which managers provided private earnings guidance to analysts, in order to investigate three interrelated questions: (1) Why did some firms provide private earnings guidance to analysts before Regulation Fair Disclosure (hereafter, Reg FD)?[1] (2) How did Reg FD affect these firms' disclosure policies? (3) What are the economic consequences of this disclosure regulation?

Prior to Reg FD, market participants were concerned that private earnings guidance created an uneven playing field that damaged investor confidence (Levitt 1998). This concern prompted policymakers to enact Reg FD to explicitly prohibit disclosure of material nonpublic information to select market participants (SEC 2000). However, the SEC is committed to assess whether Reg FD has "negative, unintended consequences" (Unger 2001), such as the so-called "chilling effect" arising if firms decide to replace private disclosure to analysts with silence rather than with public disclosure.

Existing evidence on the economic consequences of Reg FD mostly focuses on the *average* effect of the regulation on firms' disclosure behavior, market reactions to earnings announcements, and analyst behavior. Although most studies find overall increases in the quantity of public disclosures and/or decreases in market reactions to earnings announcements after Reg FD (Bailey et al. 2003; Heflin et al. 2003; Eleswarapu et al. 2004; Shane et al. 2001), disagreement exists on: (1) how to interpret the decreases in market reactions to earnings announcements,[2] and (2) how Reg FD affects analyst forecast accuracy and forecast dispersion (Bailey et al. 2003; Heflin et al. 2003; Irani and Karamanou 2003; Agrawal et al. 2006; Mohanram and Sunder 2006). This study provides sharper tests that focus on cross-sectional differences in how Reg FD affects its *target* firms' disclosure policies, and how the way these firms change their disclosure policies leads to differential economic consequences.[3]

The first goal of this paper is to identify firms that relied more on *private* disclosure to analysts before Reg FD (hereafter, pre-FD private disclosers), and then to test (previously untested) theory-based explanations for why these firms chose to do so. I identify pre-FD private disclosers by extending Matsumoto's (2002) model of *total* earnings guidance to extract *private* earnings guidance to analysts. Consistent with theoretical predictions (King et al. 1990; Dutta 1996), I find that relative to firms that disclosed mostly publicly before Reg FD (hereafter, pre-FD public disclosers), pre-FD private disclosers: (1) have higher proprietary information costs, and (2) their earnings-related information is more predictive of other firms' earnings (and thus analysts reap more benefits from their information, which I hereafter refer to as higher information transfer value for analysts). This part of the study contributes to the literature by developing and providing extensive validation checks of a new measure of private earnings guidance constructed from publicly available data. My evidence that pre-FD private disclosers have higher proprietary information costs and their earnings have higher transfer value for analysts also supports both the descriptive validity of previously untested theory and the validity of my private earnings guidance measure.

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[1] In this paper I use private earnings guidance, private disclosure to analysts, and selective disclosure interchangeably to refer to disclosure of material nonpublic information. According to the Securities and Exchange Commission, "information is material if there is a substantial likelihood that a reasonable shareholder would consider it important in making an investment decision" and "nonpublic if it has not been disseminated in a manner making it available to investors generally" (SEC 2000).

[2] Bailey et al. (2003) show that the reduction of market reactions to earnings announcements is *not* attributable to Reg FD, but to a contemporaneous event—the decimalization adopted by major stock exchanges. Around the time when the SEC enacted Reg FD, the NYSE, AMEX, and NASDAQ transitioned from the fractional system where the smallest price increment is $1/16 ($0.0625), to the finer decimal system that allows a minimum price increment of $0.01. Allowing smaller price increments reduces price and return volatilities.

[3] A few studies also consider cross-sectional differences in the effects of Reg FD on analyst behavior, transient institutional investors' trading behavior, and the cost of capital by partitioning on firm/brokerage house size (Agrawal et al. 2006; Gomes et al. 2005; Mohanram and Sunder 2006), conference call type (Ke et al. 2006), or the difficulty of valuation (Gintschel and Markov 2004). Finally, Francis et al. (2006) examine how Reg FD affects the information environments of the population of U.S. firms by using ADR firms as a control for confounding events. However, these studies do not *directly* link changes in firms' disclosure behavior to observed effects of Reg FD, nor do they focus on the firms that relied more on private disclosure to *analysts* before Reg FD—which are primary targets of Reg FD.

Given that the purpose of Reg FD is to stop selective disclosure of material nonpublic information, firms that relied more on private disclosure to analysts (i.e., the pre-FD private disclosers) should experience the largest changes in their disclosure policies in order to comply with the regulation. Accordingly, the second goal of this study is to capitalize on the exogenous shock that Reg FD imposes on the pre-FD private disclosers and use theory to predict how these firms change their disclosure policies after Reg FD. To what extent will the pre-FD private disclosers replace private guidance with public disclosure versus nondisclosure? What characteristics determine whether firms will disclose more publicly or become silent?

I find that roughly half the firms classified as pre-FD private disclosers replace private disclosure to analysts with nondisclosure, confirming the concern that Reg FD could lead to a "chilling effect" on information flow (Opdyke 2000). Consistent with predictions drawn from theory (Verrecchia 1983; Diamond and Verrecchia 1991; Verrecchia 2001), I find that firms with lower information asymmetry and higher proprietary information costs are more likely to replace private disclosure with nondisclosure than with public disclosure after Reg FD. Evidence that firms respond to exogenous regulatory shocks by changing their disclosure policies in a manner predicted by theory suggests that policymakers can use theory to better anticipate how future disclosure regulations will affect firms' behavior.

This evidence adds to the literature on the determinants of voluntary disclosure choices. Most prior studies simply document an *association* between *levels* of theory-based explanators of disclosure and firms' contemporaneous disclosure policies (e.g., Lang and Lundholm 1993; Bamber and Cheon 1998). Particularly given that firms' disclosure policies are sticky over time (e.g., Healy et al. 1999; Graham et al. 2005), such levels studies are susceptible to the possibility of correlated omitted variables, which renders their results difficult to interpret (Lang 1999). In contrast, exogenous regulatory shocks that stimulate large numbers of firms to *change* their disclosure policies at a similar point in time provide a more powerful setting in which to examine theoretical predictions about the determinants of firms' disclosure policies. My evidence that information asymmetry and proprietary information costs explain differences in the way pre-FD private disclosers choose new disclosure policies in response to Reg FD provides stronger support for the *causal* relationship that theory proposes.

I expect these systematic differences in the way pre-FD private disclosers change their disclosure policies in response to Reg FD to also affect their information environments. So the third goal of this study is to evaluate the economic consequences of Reg FD *conditional* on the changes in its target firms' disclosure policies. I find that pre-FD private disclosers that replace private disclosure with nondisclosure (hereafter, post-FD new nondisclosers) experience significant deterioration in their information environments compared to: (1) pre-FD private disclosers that replace private disclosure with public disclosure (hereafter, post-FD new public disclosers), and (2) a control group of firms less affected by Reg FD—

the pre-FD public disclosers. Specifically, after Reg FD, post-FD new nondisclosers experience significantly larger increases in the magnitude of market reactions to earnings announcements, steeper decreases in analyst coverage, and larger increases in analyst forecast errors and dispersion relative to the pre-FD public disclosers or post-FD new public disclosers. In contrast, neither post-FD new public disclosers nor pre-FD public disclosers experience significant changes in their information environments. Evidence that post-FD new public disclosers suffer no significant deterioration in their information environments is also important, because it suggests that these firms replace pre-FD private disclosure with approximately equally informative public disclosure after Reg FD.

This evidence contributes to the empirical literature on economic consequences of disclosure regulation. The SEC is committed to assess how Reg FD affected the flow of information in the market, particularly whether Reg FD led to "negative, unintended consequences" (Unger 2001). My evidence that roughly half of the firms classified as pre-FD private disclosers replace private guidance to analysts with silence rather than with public guidance after Reg FD indicates that the "chilling effect" exists; moreover, it is concentrated in the subset of firms that: (1) are the primary targets of Reg FD—the pre-FD private disclosers, and (2) find the prospect of replacing private disclosure with public disclosure too costly (i.e., those with high proprietary information costs and low information asymmetry). Policymakers should also be interested in evidence that the post-FD new public disclosers appear to have replaced private guidance with new public disclosure that is approximately equally informative. My results suggest that the broad average effects of Reg FD documented in prior research mask important cross-sectional differences. Armed with an understanding of the cross-sectional differences in Reg FD's impact on firms' information environments, particularly the unintended negative consequences, policymakers can better evaluate the costs and benefits of the regulation.

I organize the rest of the paper as follows. Section II describes the private earnings guidance measure and classification of firms. Section III develops testable hypotheses. Sections IV through VI present tests of the hypotheses, and Section VII concludes. The Appendix offers additional sensitivity analyses validating my measure of private earnings guidance.

II. IDENTIFICATION OF PRE-FD PRIVATE AND PUBLIC DISCLOSERS

Identifying Pre-FD Private Disclosers

To explore the rationale for private earnings guidance and the impact of Reg FD on its target firms, I must first identify the pre-FD private disclosers. However, prior literature does not offer a way to identify pre-FD private disclosers based on publicly available information. Thus, I first extend Matsumoto's (2002) model of total earnings guidance to extract a measure of private earnings guidance. I then identify pre-FD private disclosers based on the relative magnitude of private earnings guidance. I conclude this section with empirical evidence supporting the validity of my classification of pre-FD private disclosers.

Matsumoto's (2002) model includes four steps, as shown in the equations below.

$$\Delta EPS_{kjtq}/price_{kjt-1,q} = \alpha_{ijt} + \beta_{1ijt}(\Delta EPS_{kjtq-1}/price_{kjt-1,q-1}) + \beta_{2ijt}CRET_{kjtq} + \varepsilon_{ijt} \tag{1}$$

$$\begin{aligned} E[\Delta EPS_{ijtq}] = {} & [\hat{\alpha}_{ijt-1} + \hat{\beta}_{1ijt-1}(\Delta EPS_{ijtq-1}/price_{ijt-1,q-1}) + \hat{\beta}_{2ijt-1}CRET_{ijtq}] \\ & \times price_{ijt-1,q} \end{aligned} \tag{2}$$

$$E[F_{ijtq}] = EPS_{ijt-1,q} + E[\Delta EPS_{ijtq}] \tag{3}$$

$$UF_{ijtq} = F_{ijtq} - E[F_{ijtq}]. \tag{4}$$

Equation (1) estimates the expected seasonal change in analyst forecasts for firm i in industry j during quarter q of year t ($\Delta EPS_{ijtq} = EPS_{ijt,q} - EPS_{ijt-1,q}$), as a function of: (1) the seasonal change in the prior quarter's earnings per share ($\Delta EPS_{ijt,q-1} = EPS_{ijt,q-1} - EPS_{ijt-1,q-1}$), and (2) firm-specific daily excess returns cumulated from three days after the year $t-1$ quarter q earnings announcement to 20 days before the year t quarter q earnings announcement ($CRET_{ijtq}$). Matsumoto (2002) includes $CRET_{ijtq}$ to control for additional information (other than earnings guidance) that analysts use to forecast earnings.[4] To estimate parameters for firm i in year t, Matsumoto (2002) estimates Equation (1) separately for each firm-year, using all firm-quarters (k) in year t from firm i's four-digit SIC code industry j, excluding firm i's data.[5]

In Equation (2), Matsumoto (2002) applies the parameter estimates derived for the prior firm-year (t–1) in Equation (1) to determine the expected change in firm i's analyst forecasts ($E[\Delta EPS_{ijtq}]$) in the current quarter. Her Equation (3) adds the expected change in analyst forecasts from Equation (2) to firm i's actual earnings per share from the same quarter in the prior year (t–1) to yield the expected analyst forecast (absent earnings guidance) for the current quarter ($E[F_{ijtq}]$). In Equation (4), Matsumoto (2002) defines total earnings guidance (from both public and private disclosures) as the unexpected analyst forecast (UF_{ijtq}),[6] which is the difference between the actual analyst forecast (F_{ijtq})[7] and the expected analyst forecast of earnings per share for the current quarter. In general, more earnings guidance leads to larger magnitudes of UF (i.e., larger $|UF|$).[8]

Matsumoto (2002) uses this model to identify firms that guide their analyst earnings forecasts downward (versus upward) in order to meet or beat the forecasts.[9] For her purpose, she needs to measure total earnings guidance from both public disclosure and private disclosure to analysts. In contrast, I need to measure the *magnitude* of *private* earnings guidance so that I can identify firms that relied more on private guidance to analysts prior to Reg FD (i.e., the pre-FD private disclosers), no matter whether the guidance is upward or downward.

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[4] The Appendix discusses an alternative model specification using an industry-specific *CRET* that excludes firm *i*. This alternative specification does not materially affect my inferences. For example, the resulting measure is highly correlated with the measure used in the main analyses ($\rho = 0.92$).

[5] Following Matsumoto (2002), I estimate Equation (1) using firm-years with ten or more firm-quarters of data in the same four-digit SIC code. I also follow Matsumoto (2002) by excluding firms in regulated and quasi-regulated industries including SIC codes 6000–6999 (financial institutions), 4800–4999 (utilities), 4000–4499 (transportation), and 8000 and higher. The values of the estimated coefficients in Equation (1) are similar to Matsumoto's.

[6] Matsumoto's (2002) original notation for this measure is *UEF*. I label it *UF* to make it clear that this measure differs from unexpected earnings (and it also differs from analyst forecast errors).

[7] Following Matsumoto (2002), I use the latest consensus forecast as the actual analyst forecast.

[8] I concur with Matsumoto (2002) that *UF* is a reasonable first approximation of total earnings guidance. First, survey evidence indicates that guidance was significant before Reg FD. The majority of sell-side analysts say they regularly requested and received earnings guidance prior to Reg FD, and analysts viewed such earnings guidance as more important than other sources of information such as other analysts' opinions, market reactions, and annual reports (Association for Investment Management and Research [AIMR] 2001; Williams et al. 1996). An electronic version of this AIMR survey is available from the author upon request. Second, Matsumoto's (2002) empirical tests are joint tests of the validity of her total guidance measure and her hypotheses, so evidence supporting her hypotheses also supports the validity of her (*UF*) measure.

[9] Although prior research documents a general "walk-down" in analysts' forecasts as the earnings announcement approaches (Richardson et al. 1999), not all firms provide downward earnings guidance. In Matsumoto (2002, 509) nearly 46 percent (4,898 out of 10,676) of the sample firm-quarters have upward earnings guidance.

To estimate the portion of total earnings guidance that occurs privately to analysts, I tease out factors other than private earnings guidance that contribute to the variability of $|UF|$. These factors include earnings volatility, incidence of losses, and the number of earnings-related public disclosures issued for each quarter. I control for earnings volatility and the incidence of losses because these factors reduce the predictability of earnings and, hence, increase the variability in analysts' forecasts (Butler and Lang 1991; Basu et al. 1996). I measure earnings volatility as the standard deviation of seasonal changes in earnings per share during the previous three years (*StdΔEPS*). I measure the incidence of losses through an indicator variable that equals 1 if a firm reports a loss in the current quarter, and 0 otherwise (*LOSS*). I expect both earnings volatility and the incidence of losses to be positively associated with $|UF|$.

Finally, I control for the number of public disclosures of earnings-related information (*#PublicDisclosure*) issued for each quarter to account for the portion of total earnings guidance that is public. I use First Call's Company Issued Guideline (CIG) database and consider voluntary disclosures on future earnings, cash flows, earnings before interest, taxes, depreciation, and amortization (EBITDA), and earnings including goodwill amortization, as earnings-related disclosures. I expect the number of public disclosures to be positively associated with $|UF|$.

$$|UF_{iq}| = \gamma_{0i} + \overset{(+)}{\gamma_1 Std\Delta EPS_{iq}} + \overset{(+)}{\gamma_2 LOSS_{iq}} + \overset{(+)}{\gamma_3 \#PublicDisclosure_{iq}} + \mu_{iq}. \quad (5)$$

I define the unexplained portion of $|UF|$ (the absolute value of the sum of the firm-specific intercept and the error term) as private earnings guidance to analysts from firm *i* in quarter *q*. I then compute the average private earnings guidance for each firm-year and rank the firms within each year from 1996 to 1999 (the pre-FD period). In each year, the firm with the least private earnings guidance receives the lowest ranking so that higher rankings indicate more private earnings guidance. I classify a firm as a pre-FD private discloser if the firm's annual ranking is in the top 40 percent of the distribution in each of the firm's available years to ensure that the firm's rankings are relatively stable, and thus reflect the general tendency of the firm's disclosure behavior.

Identifying Pre-FD Public Disclosers and Pre-FD Nondisclosers

I identify the pre-FD private disclosers first because these firms are the primary targets of Reg FD. From the rest of the pre-FD sample population I construct two other groups of firms: pre-FD public disclosers and pre-FD nondisclosers. I collect management earnings-related forecasts from First Call's Company Issued Guideline (CIG) database.[10] For the firms that are not classified as pre-FD private disclosers I classify them as pre-FD public disclosers if their quarterly average number of earnings-related public disclosures is 30 percent more than the average of all pre-FD private disclosers. I classify firms (that are not classified as pre-FD private disclosers) as pre-FD nondisclosers if their quarterly average number of earnings-related public disclosures is 30 percent less than the average of all pre-FD private disclosers.[11] Following Healy et al. (1999), I require at least a 30 percent difference to ensure material differences in firms' disclosure tendency.

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[10] Anilowski et al. (2007) suggest that First Call's CIG database might omit some qualitative forecasts, compared to hand-collected forecast data used by prior research such as Miller (2002) and Hutton et al. (2003). On the other hand, there is no consensus that the CIG database is *materially* incomplete. Ajinkya et al. (2005) conclude that the CIG database is a comprehensive source of management forecast data, after performing a small-sample test by matching CIG forecasts with forecasts identified by a keyword search of Factiva. Considering the costs of hand-collecting management earnings forecast data for the whole sample over the seven year pre- and post-FD period, I rely on First Call's CIG database. Any omission of management forecasts in the CIG database will most likely add noise to my classification, thus working against my hypotheses.

Sample

Sample firms are those from the intersection of Compustat, CRSP, and I/B/E/S that have all the required data. The sample period begins in 1996, because: (1) the Private Securities Litigation Reform Act that provides broader safe harbor provisions for forward-looking voluntary disclosures became effective in December 1995, and (2) prior research concludes that management-provided earnings guidance became pervasive in the mid-nineties (Brown 2001). Reg FD became effective in October 2000. So I define 1996–1999 as the pre-FD period, and 2001–2003 as the post-FD period.

Descriptive Statistics and Results

Panel A of Table 1 reports descriptive statistics on the variables used to estimate private earnings guidance (Equation (5)). The mean absolute value of the unexpected forecast ($|UF|$) is 11 cents. Twenty-one percent of the firm-quarters report losses, and the mean number of forward-looking earnings-related public disclosures issued for each quarter is 0.23.

I use a fixed-effects model to estimate private earnings guidance. Panel B of Table 1 shows that coefficients on the standard deviation of seasonal changes in earnings per share (*StdΔEPS*) and the indicator variable for losses (*LOSS*) are both positive ($p < 0.001$), consistent with my expectation that $|UF|$ increases with earnings volatility and the incidence of losses. Also, the coefficient on the frequency of public disclosures for each quarter (*#PublicDisclosure*) is positive ($p < 0.001$) as expected because public guidance is a major part of total earnings guidance. The model is relatively well specified with an adjusted R^2 approaching 65 percent.

Panel C of Table 1 shows that the final sample for the pre-FD period includes 512 private disclosers, 538 public disclosers, and 937 nondisclosers. On average, pre-FD private disclosers issue 0.18 public disclosures per quarter, whereas pre-FD public disclosers issue 0.44 public disclosures per quarter.[12] Pre-FD nondisclosers issue only 0.05 public disclosures per quarter (i.e., an average of only one public disclosure every five years) in the pre-FD period.[13] Finding that pre-FD private disclosers issue fewer public disclosures (0.18) than the population as a whole (0.23, as shown in Panel A) is reassuring, because one would expect firms that rely more on private guidance to issue relatively fewer public disclosures.

Validity of the Classification of Pre-FD Private Disclosers

Given that private disclosure to analysts is unobservable, I first demonstrate the validity of my classification by comparing the characteristics of the firms I identify as pre-FD private

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[11] Public, private, and nondisclosure decisions are not mutually exclusive. King et al. (1990) argue that firms can pursue a mixed disclosure policy. In this paper, I use the term *disclosure policy* to indicate firms' general tendency in disclosure, not necessarily firms' formal written disclosure policies. Historically, most firms have not had formal policies guiding voluntary disclosure (e.g., Bamber and Cheon 1998, 169).

[12] In untabulated sensitivity tests, my inferences remain the same when I eliminate the 43 out of 512 (8.4 percent) pre-FD private disclosers that also engage in frequent public disclosures, as indicated by a rate of quarterly average public disclosure that exceeds that of the pre-FD public disclosers (0.44 as reported in Table (1)).

[13] Inferences also remain the same when I eliminate pre-FD nondisclosers with nonzero quarterly average public disclosures.

TABLE 1
Estimation of Private Earnings Guidance and Classification of Firms

Panel A: Descriptive Statistics on the Dependent and Independent Variables for the Private Earnings Guidance Model

Variable[a]	n	Mean	Std. Dev.	Median
$\lvert UF \rvert$	20,218	0.11	0.14	0.06
$Std\Delta EPS$	20,218	0.13	0.16	0.07
$LOSS$	20,218	0.21	0.41	0
$\#PublicDisclosure$	20,218	0.23	0.60	0

Panel B: Estimation of Private Earnings Guidance

$$|UF_{iq}| = \gamma_{0i} + \gamma_1 Std\Delta EPS_{iq} + \gamma_2 LOSS_{iq} + \gamma_3(\#PublicDisclosure)_{iq} + \mu_{iq}$$

Variable (n = 20,218)	Predicted Sign	Coeff. Estimate	Standard Error	p-value[b]
$Std\Delta EPS$	+	0.08	0.01	<0.001
$LOSS$	+	0.02	0.00	<0.001
$\#PublicDisclosure$	+	0.02	0.00	<0.001

F-Test for No Fixed Effects and No Intercept: F-value = 4.94 Pr > F: < 0.001 Adj. R^2 = 64.70%

Panel C: Descriptive Statistics on the Quarterly Average Number of Earnings-Related Public Disclosures by Type of Discloser during the Pre-FD Period (1996–1999)

Type of Discloser	Mean	Std. Dev.	Median
Pre-FD Private Discloser[c] (n = 512)	0.18	0.21	0.13
Pre-FD Public Discloser[d] (n = 538)	0.44	0.23	0.38
Pre-FD Nondiscloser[e] (n = 937)	0.05	0.05	0

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[a] Variable definitions:

$|UF|$ = absolute value of unexpected analyst forecast developed from Matsumoto's (2002) total earnings guidance model;

$Std\Delta EPS$ = standard deviation of seasonal changes in earnings per share in the previous three years;

$LOSS$ = 1 if a firm reports a loss in the current quarter, and 0 otherwise; and

$\#PublicDisclosure$ = number of forward-looking earnings-related public disclosures issued for each quarter (as recorded in First Call's CIG database), including disclosures on future earnings, cash flows, earnings before interest, taxes, depreciation, and amortization (EBITDA), and earnings including goodwill amortization.

[b] p-values are based on one-tailed test for variables with predicted signs.

[c] Pre-FD private disclosers are firms whose private guidance scores from the private earnings guidance model fall in the top 40 percent of the distribution of guidance scores in the population of Compustat/CRSP/I/B/E/S firms.

[d] Pre-FD public disclosers are firms: (1) that are not classified as pre-FD private disclosers, (2) whose quarterly average number of public disclosures is 30 percent more than the average of pre-FD private disclosers.

[e] Pre-FD nondisclosers are firms: (1) that are not classified as pre-FD private disclosers, and (2) whose quarterly average number of public disclosures is 30 percent less than the average of pre-FD private disclosers.

disclosers to the characteristics of firms that Hutton (2005) identifies as providing private guidance prior to Reg FD. Hutton (2005) uses 410 firms' self-reported responses from a proprietary survey conducted by the National Investor Relations Institute (NIRI) to identify firms that provided private earnings guidance prior to Reg FD versus those that provided no guidance.[14] So I contrast pre-FD private disclosers with pre-FD nondisclosers as identified in my sample, using the same logit model as Hutton's (2005) when she contrasts her sample of private guidance firms and no guidance firms.

Table 2 shows the results of the comparison. Column (1) shows that Hutton (2005) develops conceptually based *ex ante* predictions for eight firm characteristics included in her logit. Columns (2) and (3) show the results of my logit analysis of pre-FD private disclosers versus nondisclosers. My results are consistent with Hutton's (2005) *ex ante* predictions for six of the eight firm characteristics. Specifically, firms I identify as pre-FD private disclosers on average have higher institutional ownership, heavier analyst following, more external financing needs, more value-relevant earnings (i.e., higher industry ERC R^2), more variable revenues, and more segments. (The coefficients on the remaining two characteristics—book-to-market and percent of intangible assets—are not significant.) Hutton's (2005) logit results are weaker (as shown in columns (4) and (5)), but two of the three characteristics that are significant in her logit analysis are also significant in mine: we both find that private disclosers have higher institutional ownership and more value relevant earnings than nondisclosers. Hutton (2005) finds stronger results in her univariate analyses as shown in columns (6) and (7). Among the eight firm characteristics for which she makes predictions, Hutton (2005) finds significant univariate results for six, and my results are consistent with five of these six (pre-FD private disclosers have higher institutional ownership, heavier analyst following, higher industry ERC R^2, more variable revenues, and more segments). The primary difference between Hutton's (2005) results and mine is that her private guidance firms have significantly lower book-to-market ratios than no guidance firms, while the difference is not significant in my sample.[15] The consistency of my sample's results with Hutton's (2005) predictions (and much of her empirical evidence based on proprietary NIRI survey data) supports the validity of my classification that is based on publicly available data.

Hutton (2005) cautions against generalizing her findings out-of-sample due to the limitations of her self-reported survey data. In particular, she concludes that survey respondents are larger and somewhat more profitable than nonrespondent firms. However, Hutton (2005) is the only published empirical study that attempts to identify firms that provided private earnings guidance prior to Reg FD. Given that I identify pre-FD private disclosers *independently* from Hutton's (2005) proprietary survey data, the similarity between my results and Hutton's predictions and empirical findings on the majority of the theoretically predicted distinctions between private disclosers versus nondisclosers offers an important (albeit imperfect) validity check.

The primary limitation of my private earnings guidance measure is that it is necessarily an indirect measure, because private earnings guidance is by definition unobservable. So

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[14] Hutton (2005) classifies a firm as private guidance firm (no guidance firm) if the firm answers yes (no) to the question "Prior to the adoption of Regulation FD, did you or someone in your company review analysts' draft earnings models?" in a proprietary survey by the National Investor Relations Institute (NIRI). I do not use these survey data because they are not publicly available.

[15] Because empirical patterns that have *ex ante* theoretical support are more likely to be generalizable (and less likely to be sample-specific), my comparison above focuses on the firm characteristics for which Hutton (2005) makes conceptually based *ex ante* predictions of directional differences between private disclosers and nondisclosers. Hutton (2005) does not make *ex ante* predictions for industry-adjusted ROE and firm size, which she treats as control variables. Hutton (2005) finds no significant coefficients on these two variables in her logit, while my logit suggests that my sample private disclosers may be relatively smaller and less profitable. Moreover, differences between Hutton's (2005) sample and mine in terms of profitability and firm size are not unexpected given that Hutton's (2005, 882) sample of NIRI survey respondents is biased toward larger and somewhat more profitable firms with more active investor relations groups, whereas my sample spans a much broader cross-section of firms.

TABLE 2
Validation of Classification of Pre-FD Private Disclosers and Pre-FD Nondisclosers through Comparison with Hutton's (2005) Sample and Predictions

	Predicted Sign	Logit Analysis: My Sample (n = 1,417) (Predicting Private Discloser)		Logit Analysis: Hutton's Sample (n = 410) (Predicting Private Discloser)		Univariate Analysis: Hutton's Sample (n = 410) (Private Discloser – Nondiscloser)	
Variable[a]	(Hutton 2005, 894) (1)	Coeff. (2)	p-value (3)	Coeff. (4)	p-value (5)	Differences in Mean (6)	p-value (7)
Intercept		−0.349	0.211	0.147	0.877		
Inst Holdings	+	0.436	0.088	1.328	0.104	0.134	0.000
# of Analysts	+	0.040	0.007	0.049	0.174	4.700	<0.0001
External Financing	+	0.156	0.078	0.527	0.537	0.013	0.354
Book-to-Market	−	−0.040	0.283	−0.648	0.070	−0.162	0.028
Industry ERC R^2	+	1.979	0.000	2.014	0.036	0.090	0.001
STDV Revenues	+	0.002	0.003	−0.001	0.962	3.811	0.000
# of Segments	+	0.113	0.065	0.143	0.199	0.600	0.003
% Intangible Assets	+	−1.165	0.974	1.219	0.314	0.018	0.164
Industry adj. ROE	?	−0.203	0.045	0.181	0.705	0.091	0.169
Ln (MV)	?	−0.195	0.003	0.061	0.715	1.138	<0.0001

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[a] Variable definitions:

Inst Holdings = percentage of shares outstanding held by institutional investors measured at the month closest to the fiscal year end month (CDA Spectrum);
# of Analysts = maximum number of analysts contributing to the calculation of the consensus annual earnings forecast during the fiscal year (I/B/E/S);
External Financing = sum of all public debt and equity issuances in years −1 to +1 surrounding the year of interest, scaled by lagged total assets (SDC Global New Issues);
Book-to-Market = book value of equity to the market value of equity;
Industry ERC R^2 = computed from a regression of market-adjusted returns on annual change in earnings and level of earnings (both deflated by prior price) estimated by four-digit SIC over the fiscal years 1997–2000;
STDV Revenues = standard deviation of quarterly revenues for the last 16 quarters;
# of Segments = number of segments in which the firm operates; if the number of segments is unreported, then # of Segments is set to 1;
% Intangible Assets = percent of assets that are intangible: Compustat data item 33 divided by data item 6; if data item 33 is missing, then % Intangible Assets is set to 0;
Industry adj. ROE = net income before extraordinary items to book value of equity adjusted for the median ROE of the same four-digit SIC code; and
Ln(MV) = natural logarithm of market value of equity.

my classification undoubtedly has measurement error. Random measurement error will simply reduce the power of my analyses, and therefore work against my hypotheses. While I cannot completely rule out the possibility that some unidentified correlated omitted variable affects the findings in the study, it is unlikely that some such unidentified variable could explain the *collective* pattern of results documented in this study. Moreover, the Appendix offers a battery of additional analyses supporting the validity of my classification based on the private earnings guidance measure. Therefore, I believe that my private earnings guidance measure provides a reasonable first approximation of the unobservable private earnings guidance construct.

III. HYPOTHESIS DEVELOPMENT

In this section, I first discuss managers' incentives to disclose earnings-related information privately to analysts rather than publicly. I then draw on the theoretical literature to predict cross-sectional differences in the way pre-FD private disclosers change their disclosure policies after Reg FD explicitly prohibits private disclosure. Finally, I hypothesize that cross-sectional differences in these firms' post-FD disclosure policies lead to cross-sectional differences in the changes in their information environments.

Rationale for Choosing Private Disclosure to Analysts Instead of Public Disclosure

Theoretical research provides some insight into why managers would favor private disclosure over public disclosure.[16] In an analysis of the effects on price efficiency of private versus public disclosure, Dutta (1996) shows that when it is too costly to disclose information publicly, disclosing the information privately to analysts improves price efficiency. Dutta (1996) does not formally model the specific types of costs that would lead managers to choose private disclosure. However, the King et al. (1990) economic framework of managers' voluntary disclosure decisions posits that the higher the firm's proprietary information costs, the more likely the manager is to choose private disclosure to analysts. The reason is that analysts can aggregate detailed proprietary information into summary statistics such as earnings forecasts without disclosing the underlying details, thus protecting the firm's competitive advantage (see Diamond [1985] for a similar argument).

King et al. (1990) also predict that managers are more likely to choose private disclosure when their earnings-related information has higher transfer value for analysts. They argue that analysts reap more benefits from private access to information related to the firm's upcoming earnings if that information has "transfer value" that helps analysts predict earnings of other firms in the same industry (as is often the case for an industry leader). In this case, the (privately) disclosing firm also benefits because the analyst can extract a greater portion of his trading gains from transactions in these *other* (nondisclosing) firms' shares.[17] The disclosing firm may also expect a *quid pro quo* for the valuable private guidance in the form of more favorable treatment by the analyst. Therefore, I expect firms with higher proprietary information costs and firms whose earnings have higher information transfer value for analysts to be more likely to choose private disclosure.

> **H1:** Pre-FD private disclosers have higher proprietary information costs and their earnings-related information has higher information transfer value for analysts, relative to pre-FD public disclosers.

Pre-FD Private Disclosers' Incentives to Replace Private Disclosure with Public Disclosure versus Nondisclosure after Reg FD

After the SEC enacted Reg FD, pre-FD private disclosers had only a "binary choice" to comply with the regulation: (1) replace private disclosure with public disclosure and become a post-FD new public discloser, or (2) replace private disclosure with nondisclosure and become a post-FD new nondiscloser (*Wall Street Journal* 2005). Although policymakers intend Reg FD to channel private disclosure into public disclosure, extant research has not directly addressed the extent and conditions under which pre-FD private disclosers will actually do so.

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[16] I do not consider pre-FD nondisclosers in this formal hypothesis because: (1) prior literature offers no theory on managers' choice between private disclosure and nondisclosure, (2) pre-FD nondisclosers are *not* targets of Reg FD, and in any event, and (3) empirical estimation of a multinomial logit model including pre-FD nondisclosers does not affect my inferences on managers' choice between public and private disclosure (i.e., does not affect inferences on H1). Further investigation of managers' choice between private and nondisclosure is beyond the scope of this study.

[17] That is, the analyst is willing to make concessions to the disclosing firm by: (1) refraining from trading (or trading less) on the disclosing firm's shares (although an analyst technically violates federal securities law if he trades on his own account after acquiring private information directly from the firm, Dooley [1980] argues that "if the analyst confines his trading gains to small amounts he is unlikely to be prosecuted."); and/or (2) lowering the intermediation costs for the disclosing firm.

The promulgation of Reg FD also provides a powerful context for testing theories about the determinants of voluntary disclosure, because I focus on a setting where a substantial proportion of firms must change their disclosure policies at roughly the same point in time. Given the stickiness of firms' disclosure policies, focusing on the determinants of *changes* in firms' disclosure policies provides stronger evidence of the sequential *causal* relations proposed in theories of voluntary disclosure (Lang 1999), whereas prior research primarily used *levels* designs that merely provide evidence of *associations*.[18]

For example, prior theoretical research predicts that information asymmetry gives managers incentives to engage in public disclosure. Diamond and Verrecchia's (1991) model shows that managers can reduce information asymmetry and, hence, reduce the firm's cost of capital by engaging in public disclosure that increases liquidity in the market for the firm's shares. Similarly, Verrecchia (2001) also demonstrates that firms can reduce the information asymmetry component of cost of capital through higher levels of public disclosures. Thus, these studies suggest that pre-FD private disclosers suffering higher levels of information asymmetry have more incentive to replace private disclosure with public disclosure, in order to reduce information asymmetry and thus their cost of capital.

On the other hand, Verrecchia (1983) develops a rational expectations model showing that the higher the proprietary information costs, the less likely the manager will disclose publicly (see also Wagenhofer 1990; Darrough 1993). Releasing proprietary information such as estimates of future earnings after launching a new product can erode the firm's future profitability, if the firm's competitors act on the information.

Taken together, the theoretical literature suggests that firms that have relatively lower information asymmetry and higher proprietary information costs are more likely to replace private disclosure with *nondisclosure* than with public disclosure.[19]

> **H2:** After Reg FD, the probability that a pre-FD private discloser becomes a post-FD new nondiscloser is: (1) negatively associated with information asymmetry in the market for the firm's shares, and (2) positively associated with its proprietary information costs.

Cross-Sectional Differences in the Changes in Firms' Information Environments after Reg FD

Policymakers care about the economic consequences of disclosure regulations. For example, the SEC is committed to assessing the impact of Reg FD. In her special study on Reg FD, former SEC Commissioner Laura Unger concludes that it is unclear how Reg FD affected the flow of information in the markets (Unger 2001). As the primary targets of Reg FD, the changes in the information environments of pre-FD private disclosers are of great interest to policymakers. I expect the cross-sectional differences in the new disclosure policies that pre-FD private disclosers choose after Reg FD to lead to cross-sectional differences in the changes in their information environments.[20]

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[18] One exception is Botosan and Harris (2000), who examine firms' decisions to initiate *quarterly* (voluntary) segment reporting. Although Botosan and Harris (2000) find some mixed evidence of a relation between information asymmetry and changes in voluntary quarterly segment reporting, they do not find any evidence on the relation between proprietary information cost and voluntary quarterly segment reporting.

[19] Information transfer value for analysts arises *only* from private disclosure, so it is relevant to the choice between private and public disclosure (H1), but (as I confirm in untabulated sensitivity tests) it is not relevant to managers' choice between public disclosure and nondisclosure (H2).

Ex ante, it is not clear whether post-FD new public disclosers' information environments will improve or deteriorate. Policymakers hoped that firms would replace private disclosure with equally informative public disclosure. Indeed, shortly after Reg FD became effective, former SEC Chairman Arthur Levitt claimed that "investors receive more and better information today than ever before" (Fool.com 2000). On the other hand, firms for whom private disclosure to analysts was optimal before Reg FD must face costs of public disclosure, so the higher costs of public (relative to private) disclosure could cause them to replace their pre-FD private disclosure with less informative public disclosure. Consequently, I do not propose directional hypotheses for post-FD new public disclosers, but instead provide descriptive evidence on changes in their information environments.[21]

In contrast, post-FD new nondisclosers' information environments are likely to deteriorate because they are prohibited from private disclosure but they do not replace pre-FD private disclosure with more public disclosures. Thus, I expect post-FD new nondisclosers to suffer more impairment to their information environments than post-FD new public disclosers (who replace private disclosure with public disclosure).

To control for over-time changes in the economic environment that are unrelated to Reg FD (e.g., decimalization of the major stock exchanges [Bailey et al. 2003] and the upward secular trend in the frequency of earnings-related public disclosures [Anilowski et al. 2007]), I also use pre-FD public disclosers as a benchmark group. As the label suggests, pre-FD public disclosers typically disclose earnings-related information publicly rather than privately, even before Reg FD. Thus, Reg FD should have less impact on these firms' information environments.[22] I expect post-FD new nondisclosers to suffer more impairment to their information environments than pre-FD public disclosers.

Following prior research, I use four proxies for the changes in firms' information environments: changes in the magnitude of price reactions to earnings announcements, changes in the number of analysts following the firm, changes in the magnitude of errors in analysts' forecasts, and changes in the dispersion in analysts' forecasts.

The magnitude of price reactions to the firm's earnings announcements is inversely related to the quality of information available before earnings announcements. In a two-period rational expectations model, Kim and Verrecchia (1991) show that the magnitude of price reaction to a public announcement decreases with the precision of preannouncement (public and private) information. For reasons explained above, I expect post-FD new nondisclosers to suffer more deterioration in their preannouncement information environments. So I expect post-FD new nondisclosers to experience greater increases in the magnitude of price reactions to their earnings announcements than either post-FD new public disclosers or pre-FD public disclosers.[23]

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[20] Gintschel and Markov (2004) find that, after Reg FD, the price impact of brokerage announcements of analyst earnings forecasts and stock recommendations decreases more for firms that are hard to value and presumably provided more selective disclosures prior to Reg FD. My study complements theirs by developing a more direct estimate of firms engaging in selective disclosure prior to Reg FD, and then investigating cross-sectional differences in changes in disclosure policies and how these changes affect the resulting information environments *within* the set of pre-FD private disclosers.

[21] As long as these firms' post-FD new public disclosures have some information content, however, their post-FD information environments should deteriorate less than those of the post-FD new nondisclosers.

[22] Consistent with my expectation that pre-FD public disclosers should be less affected by Reg FD, in untabulated analyses, I find that pre-FD public disclosers experience a *smaller* absolute percentage change in their public disclosure rates than pre-FD private disclosers around Reg FD ($p < 0.01$). Consistent with the notion that pre-FD private disclosers are more affected by Reg FD, I find that these firms experience a *larger* absolute percentage change in their own public disclosure rates around Reg FD relative to changes in their public disclosure rates within the pre-FD period ($p = 0.002$). Thus, I find that pre-FD private disclosers experience unusually large changes in their public disclosure rates after Reg FD relative to *both*: (1) changes in their own disclosure rates within the pre-FD period, and (2) changes in disclosure rates of the (relatively unaffected) pre-FD public disclosers around Reg FD. This further validates my classification of private disclosers because these are the firms that should be most affected by Reg FD, and it also suggests that the changes I find in the public disclosure rates of pre-FD private disclosers are in fact attributable to Reg FD.

> **H3a:** Post-FD new nondisclosers experience larger increases in the magnitude of price reactions to earnings announcements after Reg FD than: (1) post-FD new public disclosers, and (2) pre-FD public disclosers.

Another measure of information environment is the number of analysts following the firm. Lang and Lundholm (1996) find that increases in disclosure quality (measured as increases in analysts' subjective ratings of firms' disclosure policies—the AIMR ratings), lead to increases in analyst following, and vice versa. Their results suggest that analysts are most likely to drop firms with the steepest decrease in disclosure quality—the pre-FD private disclosers who become post-FD new nondisclosers.[24] So I expect post-FD new nondisclosers to suffer steeper decreases in analyst following than either post-FD new public disclosers or pre-FD public disclosers.

> **H3b:** Post-FD new nondisclosers experience steeper decreases in analyst following after Reg FD than: (1) post-FD new public disclosers, and (2) pre-FD public disclosers.

Lang and Lundholm (1996) also show that better disclosure quality (again, measured by AIMR ratings) is associated with greater analyst forecast accuracy and lower analyst forecast dispersion. I expect firms with the most impaired information environments, the post-FD new nondisclosers, to suffer larger increases in analyst forecast errors and dispersion than either post-FD new public disclosers or pre-FD public disclosers.

> **H3c:** Post-FD new nondisclosers experience larger increases in analyst forecast errors after Reg FD than: (1) post-FD new public disclosers, and (2) pre-FD public disclosers.
>
> **H3d:** Post-FD new nondisclosers experience larger increases in analyst forecast dispersion after Reg FD than: (1) post-FD new public disclosers, and (2) pre-FD public disclosers.

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[23] Francis et al. (2002) find that absolute abnormal returns for the three days centered on earnings announcements have increased over time. They attribute this finding to increases in concurrent information disclosed in earnings announcement press releases. Because I compare the *cross-sectional differences* in the *changes* in price reactions to earnings announcements, the trend that Francis et al. (2002) document should not affect my inferences. By focusing on cross-sectional differences, my research design also abstracts from the effects of decimalization (and any other market or economy-wide changes that affect all firms) on price reactions to earnings announcements, as documented in Bailey et al. (2003).

[24] Alternatively, analysts might perceive an opportunity to add value by following firms that become silent and therefore increase coverage on these firms. Thus, there is some tension in H3b.

IV. TESTING FIRMS' DECISIONS BETWEEN PRIVATE AND PUBLIC DISCLOSURE BEFORE REG FD

Research Design

Hypothesis 1 predicts that pre-FD private disclosers have higher proprietary information costs and their earnings have higher information transfer value for analysts, relative to pre-FD public disclosers. To test H1, I estimate Equation (6) below. I use an indicator variable to capture firms' disclosure policy before Reg FD (*preFD_Private* = 1 for pre-FD private disclosers, and 0 for pre-FD public disclosers). I regress this indicator variable on proxies for firms' pre-FD levels of proprietary information costs and information transfer value. The lack of empirical evidence on managers' choice between public disclosure versus private disclosure to analysts makes it difficult to identify control variables. Drawing on empirical research on managers' choice between public disclosure and nondisclosure, I control for litigation risk, issuance of equity and debt, firm performance, and firm size. However, I do not develop directional predictions for these control variables.

$$\begin{aligned}\Pr(preFD\_PRIVATE = 1) = {} & \beta_0 + \overset{(+)}{\beta_1 R\&D_{pre}} + \overset{(+)}{\beta_2 TRANSFER_{pre}} \\ & + \overset{(?)}{\beta_3 LITIGATION_{pre}} + \overset{(?)}{\beta_4 ISSUANCE_{pre}} \\ & + \overset{(?)}{\beta_5 ROE_{pre}} + \overset{(?)}{\beta_6 SIZE_{pre}} + \varepsilon.\end{aligned} \tag{6}$$

King et al. (1990) recommend four alternative empirical measures for proprietary information costs: (1) the number of patents for which the firm applies, (2) the frequency of litigation over corporate patent rights, (3) the level of R&D expenditures, and (4) measures of competitiveness in the firm's product market. Data are not readily available for the first two measures. Measures of competitiveness in the firm's product market (such as the Herfindahl-Hirschman Index) are industry-level measures that do not capture intra-industry variation in proprietary information costs.[25] Therefore, I use R&D expenditures scaled by total assets ($R\&D_{pre}$), averaged over the pre-FD period (1996–1999), to measure proprietary information costs.[26] The higher the R&D expenditures, the higher the firm's proprietary information costs. I expect the coefficient on $R\&D_{pre}$ to be positive.

I measure intra-industry information transfer ($TRANSFER_{pre}$) as the average absolute value of pair-wise correlations between firm *i*'s three-day cumulative abnormal returns around its annual earnings announcement ($CAR_{-1,+1}$) and the same three-day cumulative abnormal returns for other firms in the same four-digit SIC code during the pre-FD period (Foster 1981; Baginski 1987).[27] The higher the average absolute correlation, the more informative the firm's information is about earnings of other firms in the same industry, and the higher the information transfer value for the firm's analysts. So I expect the coefficient on $TRANSFER_{pre}$ to be positive.

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[25] It is important to use a measure that captures firm-specific proprietary information costs, because sensitivity tests (untabulated) reveal that intra-industry variation in proprietary information costs plays an important role in explaining firms' disclosure choices. For example, my inferences remain the same when I use industry-median-adjusted R&D expenditures. Thus, Harris's (1998) industry-level measure of the speed of profit adjustment that reflects competition within each industry over time is not a suitable proxy for my study because her measure does not reflect firm-specific proprietary information costs.

[26] Inferences also remain the same when I use the ranks of R&D.

[27] I exclude the correlation between any two firms that announce earnings on the same day.

I measure litigation costs through an indicator variable ($LITIGATION_{pre}$) that equals 1 if a firm is in a high litigation risk industry and suffers an earnings decrease of more than 20 percent for at least one year during the pre-FD period (Francis et al. 1994), and 0 otherwise.[28] I measure firms' external financing activities over the pre-FD period ($ISSUANCE_{pre}$) as the cumulative proceeds from equity offering and public debt issuance reported in the Securities Data Company's (SDC) Global New Issues database, scaled by total assets averaged over the same period (Frankel et al. 1995).[29] Firm performance is measured through industry-median adjusted return on equity averaged over the pre-FD period (ROE_{pre}). Finally, I measure firm size as the natural logarithm of market value of equity averaged over the pre-FD period ($SIZE_{pre}$).

Results of Testing H1

Panel A of Table 3 provides descriptive statistics for the variables used to test H1. The sample firms' average R&D expenditures are about 6 percent of total assets, and the average information transfer value for the sample firms is about 0.20. Panel B of Table 3 reports the logit analysis of firms' decisions between private and public disclosure before Reg FD. Consistent with H1, I find that firms with higher proprietary information costs and higher information transfer values are more likely to choose private disclosure to analysts ($p < 0.01$). The %Change in Odds column indicates that a standard deviation increase in $R\&D_{pre}$ and $TRANSFER_{pre}$ increases the odds of becoming a pre-FD private discloser by 31.58 percent and 22.19 percent, respectively. Because this is a joint test of predictions from prior theoretical research and the validity of my classification, this evidence consistent with the predictions also supports the validity of my classification. Regarding the control variables, I find that pre-FD private disclosers have lower litigation risk, more external financing, weaker performance, and smaller market value of equity than pre-FD public disclosers ($p < 0.05$).

Table 3 provides the first empirical evidence (of which I am aware) on factors associated with managers' choice between private and public disclosure. Because the classification of firms' disclosure policies (dependent variable) and factors that explain the disclosure policy decisions (independent variables) are measured over the same pre-FD period, however, the results displayed in Table 3 provide evidence of an *association* between the dependent and independent variables. A limitation of this analysis (which is also a limitation of most of the prior research on determinants of managers' voluntary disclosure choice) is that without determining a point in time when the firm first adopted the disclosure policy, it is difficult to conduct the kind of sequential analysis that could verify whether factors proposed by theory actually *cause* firms to choose different disclosure policies. In contrast, when disclosure regulation imposes an exogenous shock on firms' disclosure policies, there is a unique opportunity to assess how pre-regulation firm characteristics affect firms' choices of

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[28] I classify high litigation risk industries as SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), 5200–5961 (retailing), and 8731–8734 (R&D service) (Francis et al. 1994; Kasznik and Lev 1995; Baginski et al. 2002; Matsumoto 2002).

[29] Frankel et al. (1995) find that cumulative offering proceeds scaled by total assets is highly correlated ($\rho = 0.88$) with the frequency of offering. Thus, it is not surprising that using the total frequency of external financing as an alternative measure of accessing capital markets does not affect my inferences.

TABLE 3

Tests of Factors Associated with Managers' Disclosure Choices before Reg FD –Private Discloser versus Public Discloser (H1)

Panel A: Descriptive Statistics on Firm Characteristics

Variable[a]	Mean	Std. Dev.	Median
$R\&D_{pre}$	0.06	0.10	0.02
$TRANSFER_{pre}$	0.20	0.17	0.16
$LITIGATION_{pre}$	0.32	0.47	0.00
$ISSUANCE_{pre}$	0.19	0.35	0.00
ROE_{pre}	0.01	0.69	0.05
$SIZE_{pre}$	6.10	1.81	5.94

Panel B: Logit Analysis of Managers' Choices between Private and Public Disclosure

$$\Pr(preFD\_PRIVATE = 1) = \alpha_0 + \beta_1 R\&D_{pre} + \beta_2 TRANSFER_{pre} + \beta_3 LITIGATION_{pre} + \beta_4 ISSUANCE_{pre} + \beta_5 ROE_{pre} + \beta_6 SIZE_{pre} + \varepsilon$$

Variable (n = 976)	Predicted Sign	Coeff. Estimate	Standard Error	p-value[b]	% Change in Odds[c]
Intercept		0.82	0.29	0.005	
$R\&D_{pre}$	+	2.63	0.83	0.001	31.58
$TRANSFER_{pre}$	+	1.19	0.41	0.002	22.19
$LITIGATION_{pre}$	?	−0.60	0.16	<0.001	−44.90
$ISSUANCE_{pre}$	?	0.81	0.23	<0.001	32.73
ROE_{pre}	?	−0.23	0.11	0.045	−14.73
$SIZE_{pre}$	?	−0.22	0.01	<0.001	−33.12

Likelihood Ratio Chi-square (χ^2) = 94.576 Percent concordant = 66.4
Pr > Chi-square: < 0.001 Percent discordant = 33.2
Pseudo R^2 = 12.34%

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[a] Variable definitions:

$R\&D_{pre}$ = R&D expenditures scaled by total assets, averaged over 1996–1999;
$TRANSFER_{pre}$ = average absolute value of pair-wise correlations between firm *i*'s three-day cumulative abnormal returns ($CAR_{-1,+1}$) around its annual earnings announcement and the same three-day cumulative abnormal returns for other firms in the same four-digit SIC code during 1996–1999;
$LITIGATION_{pre}$ = 1 if a firm is in a high litigation risk industry and has an earnings decrease of more than 20% for at least one year during 1996–1999, and 0 otherwise;
$ISSUANCE_{pre}$ = cumulative proceeds from external equity and debt issuance during 1996–1999, scaled by average total assets over the same period;
ROE_{pre} = industry-median adjusted return on equity (operating income divided by the average of beginning and ending book value of common equity), averaged over 1996–1999; and
$SIZE_{pre}$ = natural logarithm of market value of equity, averaged over 1996–1999.

[b] p-values are one-tailed for variables with predicted signs and two-tailed for variables without predicted signs.

[c] The percentage change in odds reflects the effect of a change in the independent variable on the odds of becoming pre-FD private discloser instead of pre-FD public discloser. The percentage change in odds for continuous variables is $100[\exp(s_i\beta_i) - 1]$, where s_i is the sample standard deviation of variable *i* and β_i is the coefficient estimate for the variable. The percentage change in odds for indicator variables is $100[\exp(\beta_i) - 1]$.

new post-regulation disclosure policies. Thus, my next set of tests probe the determinants of cross-sectional differences in the way pre-FD private disclosers choose new post-regulation disclosure policies after Reg FD prohibits private disclosure.

V. TESTING CROSS-SECTIONAL DIFFERENCES IN PRE-FD PRIVATE DISCLOSERS' CHOICES OF NEW DISCLOSURE POLICIES AFTER REG FD PROHIBITS PRIVATE GUIDANCE

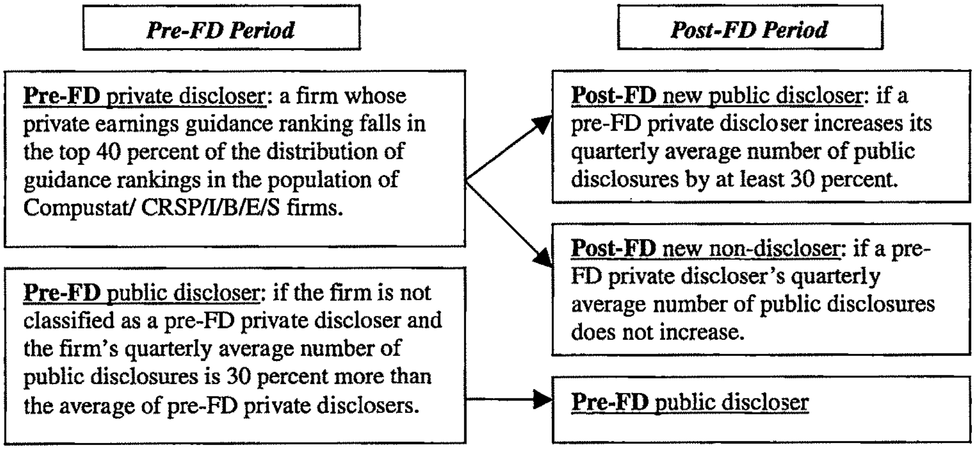
Research Design

To comply with Reg FD, pre-FD private disclosers must replace private disclosure with either public disclosure (i.e., become post-FD new public disclosers) or nondisclosure (i.e., become post-FD new nondisclosers). I classify a pre-FD private discloser as a post-FD new public discloser if the firm's quarterly average number of earnings-related public disclosures increases by 30 percent or more after Reg FD. If the firm's earnings-related public disclosures do not increase after Reg FD, I classify the firm as a post-FD new nondiscloser. Figure 1 summarizes the classification.

Hypothesis 2 predicts that pre-FD private disclosers with lower information asymmetry and higher proprietary information costs are more likely to replace private disclosure with silence and thus become post-FD new nondisclosers. To test H2, Equation (7) below examines the determinants of pre-FD private disclosers' new disclosure policies after Reg FD. I model the probability that a pre-FD private discloser becomes a post-FD new nondiscloser (*postFD_NewNon* = 1) as a function of a proxy for information asymmetry and a proxy for the firm's proprietary information costs in the pre-FD period, after controlling for other determinants of disclosure policies such as litigation risk, issuance of equity and debt, firm performance, and firm size.

$$\begin{aligned}\Pr(postFD\_NewNon = 1) = {} & \beta_0 + \overset{(-)}{\beta_1 PIN_{pre}} + \overset{(+)}{\beta_2 R\&D_{pre}} \\ & + \overset{(-)}{\beta_3 LITIGATION_{pre}} + \overset{(-)}{\beta_4 ISSUANCE_{pre}} \\ & + \overset{(-)}{\beta_5 ROE_{pre}} + \overset{(-)}{\beta_6 SIZE_{pre}} + \varepsilon. \end{aligned} \tag{7}$$

FIGURE 1
Classification of Firms of Interest in the Pre- and Post-FD Periods



Pre-FD private discloser: a firm whose private earnings guidance ranking falls in the top 40 percent of the distribution of guidance rankings in the population of Compustat/ CRSP/I/B/E/S firms.

Pre-FD public discloser: if the firm is not classified as a pre-FD private discloser and the firm's quarterly average number of public disclosures is 30 percent more than the average of pre-FD private disclosers.

Post-FD new public discloser: if a pre-FD private discloser increases its quarterly average number of public disclosures by at least 30 percent.

Post-FD new non-discloser: if a pre-FD private discloser's quarterly average number of public disclosures does not increase.

Pre-FD public discloser

I measure all the determinants of disclosure policies in the pre-FD period to better capture how they motivate firms to select new disclosure policies after Reg FD prohibits private disclosure. I use the probability of informed trading averaged over the pre-FD period (PIN_{pre}) to proxy for information asymmetry.[30] Intuitively, *PIN* uses information conveyed by the frequency and imbalance of trades to measure the probability that particular trade orders come from informed investors (Easley et al. 1998). The higher the PIN_{pre}, the greater the potential for public disclosure to reduce information asymmetry (and hence reduce the firm's cost of capital). Because H2 predicts that firms with lower information asymmetry are more likely to choose nondisclosure after Reg FD, I expect the coefficient on PIN_{pre} to be negative.[31] Hypothesis 2 also predicts that firms with higher proprietary information costs are more likely to choose nondisclosure after Reg FD. I use R&D expenditures scaled by total assets, averaged over the pre-FD period ($R\&D_{pre}$), as a measure of proprietary information costs. The higher the $R\&D_{pre}$, the higher the firm's proprietary information costs. So I expect the coefficient on $R\&D_{pre}$ to be positive.

I control for litigation costs because firms in industries with higher litigation risk, who also have bad earnings news, are more likely to disclose publicly (Skinner 1994; Kasznik and Lev 1995; Baginski et al. 2002; Graham et al. 2005). I expect firms with higher litigation risk are less likely to choose nondisclosure after Reg FD, so I expect the coefficient on $LITIGATION_{pre}$ to be negative. Frankel et al. (1995) find that firms that access capital markets during an extended period also issue more public disclosures.[32] Thus, I control for external financing activities. I expect firms with more external financing activities to be less likely to choose nondisclosure after Reg FD, so I expect the coefficient on $ISSUANCE_{pre}$ to be negative. Miller (2002) examines the relation between firm performance and voluntary disclosure in a sample of firms with sustained increases in earnings performance. He finds that these firms increase public disclosures when they experience sustained strong earnings performance. So I control for firm performance (ROE_{pre}). I expect firms that sustained stronger performance throughout the pre-FD period to be less likely to become post-FD new nondisclosers. I expect the coefficient on ROE_{pre} to be negative. I control for firm size because larger firms issue more public disclosures (Lang and Lundholm 1993; Kasznik and Lev 1995). I expect larger firms to be less likely to choose nondisclosure after Reg FD. So I expect the coefficient on $SIZE_{pre}$ to be negative.

Results of Testing H2

Table 4 shows that of the pre-FD private disclosers that enter the post-FD period, 150 (44 percent) firms become post-FD new public disclosers and 191 (56 percent) become post-FD new nondisclosers.[33,34] These results are relevant to policymakers because regulators hoped Reg FD would prompt firms to replace private disclosure with public disclosure. However, I find that roughly half of the firms that are the primary targets of Reg FD replace private disclosure with nondisclosure, which is inconsistent with then SEC Chairman Levitt's claim that after Reg FD "investors receive more and better information ... than ever before" (Fool.com 2000). Of the pre-FD public disclosers, 434 enter the post-FD period.[35]

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[30] See Easley et al. (1997), Easley et al. (1998), and Brown et al. (2004) for details about *PIN* estimation.

[31] This prediction is also consistent with Coller and Yohn's (1997) evidence that managers are less likely to issue public disclosures (management earnings forecasts) when information asymmetry (as measured by bid-ask spread) is relatively low, and they are more likely to issue public disclosures when information asymmetry is relatively high. Because bid-ask spread is a coarse measure of information asymmetry (Callahan et al. 1997), I use the finer *PIN* measure. However, in untabulated sensitivity analyses, I find that using bid-ask spread in the pre-FD period as an alternative measure of information asymmetry does not affect my inferences.

[32] Lang and Lundholm (2000) also find that firms engaging in seasoned equity offerings issue more voluntary disclosures shortly before the offering. However, I am interested in explaining cross-sectional differences in disclosure policies over a three-year post-FD period. Short-term voluntary disclosure behavior is not my focus.

Of the 341 firms classified as either post-FD new nondisclosers or post-FD new public disclosers, 327 have data on all the variables required to test theoretical predictions about the determinants of cross-sectional differences in their disclosure policies after Reg FD.

TABLE 4

Changes in the Quarterly Average Number of Earnings-Related Public Disclosures by Pre-FD Private Disclosers and Pre-FD Public Disclosers around Reg FD

	Mean		Median		Std. Dev.	
Type of Discloser	**Pre-FD**	**Post-FD (% change)**	**Pre-FD**	**Post-FD (% change)**	**Pre-FD**	**Post-FD**
Post-FD New Public Discloser[a] (n = 150)	0.21	0.99 (371.43)	0.13	0.67 (415.38)	0.21	0.86
Post-FD New Nondiscloser[b] (n = 191)	0.18	0.04 (−77.78)	0.13	0 (−100)	0.21	0.13
Pre-FD Public Discloser[c] (n = 434)	0.45	1.13 (151.11)	0.38	0.83 (118.42)	0.24	1.19

[a] Post-FD new public disclosers are firms: (1) that were pre-FD private disclosers, and (2) increase their quarterly average number of public disclosures by more than 30 percent after Reg FD.

[b] Post-FD new nondisclosers are firms: (1) that were pre-FD private disclosers, and (2) whose quarterly average number of public disclosures does not increase after Reg FD.

[c] Pre-FD public disclosers are firms: (1) that are not classified as pre-FD private disclosers, and (2) whose quarterly average number of public disclosures is 30 percent more than the average of pre-FD private disclosers before Reg FD.

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[33] A total of 345 pre-FD private disclosers enter the post-FD period. Four firms are not classified into either group because they increase their average number of public disclosures by less than 30 percent. It is possible that firms that were delisted and lost analyst coverage during the post-FD period may be dropped from the CIG database, and thus could be misclassified as new nondisclosers. However, deleting these firms from the analysis does not affect my inferences, and post-FD new nondisclosers are still roughly half of the sample. Finally, inferences remain unchanged when I delete firms that may not have been covered by the CIG database at all, and that therefore may be misclassified as post-FD new nondisclosers. In particular, the inferences are robust when I rerun the analysis after eliminating 13 post-FD new nondisclosers that: (1) have zero public disclosure in both the pre- and post-FD periods, and (2) are not covered by First Call's analysts (Ajinkya et al. 2005). Results are untabulated.

[34] These cross-sectional differences in the way firms change their public disclosure rates after Reg FD contrast with the Bushee et al. (2004) conclusion that there is limited cross-sectional variability in Reg FD's effects on the conference call element of firms' disclosure policies. Specifically, they find that most firms (96.4 percent) that hosted closed conference calls before Reg FD continue to host conference calls after Reg FD (presumably all become open conference calls). Evidence that Reg FD increases the breadth of access to conference calls is of interest in itself, but is not necessarily reflective of Reg FD's effects on other elements of firms' disclosure policies.

[35] Table 4 also shows similarity in the frequency of public disclosures issued by: (1) post-FD new nondisclosers and post-FD new public disclosers during the *pre*-FD period (0.21 and 0.18, respectively), supporting my classification of these firms into the same pre-FD private discloser group; and (2) post-FD new public disclosers and pre-FD public disclosers during the *post*-FD period (0.99 and 1.13, respectively). Neither of these similarities is by construction, so they support my later conclusion that the subset of pre-FD private disclosers that replace private disclosure with public disclosure behave more like public disclosers after Reg FD.

Panel A of Table 5 provides descriptive statistics for the variables used to test H2. On average, the sample firms have a *PIN* of 18 percent, and their *R&D* expenditures are about 7 percent of total assets.

Panel B of Table 5 presents results of the logit analysis. Consistent with H2, I find that firms with lower information asymmetry (i.e., lower PIN_{pre}) and higher proprietary information costs (i.e., higher $R\&D_{pre}$) are more likely to replace private disclosure with nondisclosure after Reg FD ($p = 0.032$ and $p = 0.005$, respectively). The %Change in Odds column shows that these effects are economically significant. A standard deviation increase in PIN_{pre} decreases the odds of becoming a post-FD new nondiscloser by 25.41 percent, while a standard deviation increase in $R\&D_{pre}$ increases the odds of becoming a post-FD new nondiscloser by 55.15 percent. Smaller firms are also more likely to become post-FD new nondisclosers ($p < 0.001$). Finally, the coefficients on the $LITIGATION_{pre}$, $ISSUANCE_{pre}$, and ROE_{pre} are not significant at conventional levels.

VI. TESTING THE ECONOMIC CONSEQUENCES OF DISCLOSURE REGULATION: CHANGES IN FIRMS' INFORMATION ENVIRONMENTS AFTER REG FD

Research Design

Hypotheses 3a through 3d predict that the information environment deteriorates more for post-FD new nondisclosers than: (1) post-FD new public disclosers, and (2) pre-FD public disclosers. This analysis also yields evidence on changes in post-FD new public disclosers' information environments, which is important because policymakers want to know whether these firms replaced private disclosure with public disclosure that is equally or less informative than their pre-FD private disclosure.

For each measure of information environment, I estimate a model of the following form:

$$\Delta INFO\_ENV = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \gamma' Controls + \mu \tag{8}$$

where:

$\Delta INFO\_ENV$ = changes in information environment measures (post-FD minus pre-FD);
$PostFD\_NewNon$ = 1 for pre-FD private disclosers that become post-FD new nondisclosers, and 0 otherwise;
$PostFD\_NewPublic$ = 1 for pre-FD private disclosers that become post-FD new public disclosers, and 0 otherwise; and
$Controls$ = controls for other (non-disclosure related) factors that could affect changes in the information environment measures.

In Equation (8), δ_0 measures the change in the information environments of pre-FD public disclosers. δ_1 measures the differences in the change in information environments between post-FD new nondisclosers and pre-FD public disclosers. δ_2 measures the differences in the change in information environments between post-FD new public disclosers and pre-FD public disclosers. The difference between δ_1 and δ_2 ($\delta_1 - \delta_2$) reflects differences in the change in information environments between post-FD new nondisclosers and post-FD new public disclosers. Finally, the sum of δ_0 and δ_2 ($\delta_0 + \delta_2$) indicates the change in the information environments of post-FD new public disclosers.

TABLE 5
Tests of the Pre-FD Private Disclosers' Decisions between More Public Disclosures versus Nondisclosure after Reg FD (H2)

Panel A: Descriptive Statistics on Firm Characteristics

Variable[a]	Mean	Std. Dev.	Median
PIN_{pre}	0.18	0.04	0.18
$R\&D_{pre}$	0.07	0.12	0.01
$LITIGATION_{pre}$	0.29	0.46	0.00
$ISSUANCE_{pre}$	0.25	0.42	0.04
ROE_{pre}	−0.26	6.49	0.16
$SIZE_{pre}$	5.77	1.65	5.54

Panel B: Logit Analysis of Pre-FD Private Disclosers' Decisions between More Public Disclosures versus Nondisclosure after Reg FD

$$\begin{aligned}\Pr(postFD\_NewNon = 1) = {} & \alpha_0 + \beta_1 PIN_{pre} + \beta_2 R\&D_{pre} + \beta_3 LITIGATION_{pre} \\ & + \beta_4 ISSUANCE_{pre} + \beta_5 ROE_{pre} + \beta_6 SIZE_{pre} + \varepsilon\end{aligned}$$

Variable (n = 327)	Predicted Sign	Coeff. Estimate	Standard Error	p-value[b]	% Change in Odds[c]
Intercept		4.84	1.29	<0.001	
PIN_{pre}	−	−7.33	3.96	0.032	−25.41
$R\&D_{pre}$	+	3.66	1.41	0.005	55.15
$LITIGATION_{pre}$	−	−0.28	0.30	0.173	−24.42
$ISSUANCE_{pre}$	−	−0.40	0.31	0.105	−15.46
ROE_{pre}	−	−0.03	0.07	0.322	−17.69
$SIZE_{pre}$	−	−0.57	0.12	<0.001	−60.96

Likelihood Ratio Chi-square (χ^2) = 48.740 Percent concordant = 72.4
Pr > Chi-square: < 0.001 Percent discordant = 27.3
Pseudo R^2 = 18.56%

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[a] Variable definitions:
PIN_{pre} = probability of informed trading, averaged over 1996–1999;
$R\&D_{pre}$ = R&D expenditures scaled by total assets, averaged over 1996–1999;
$LITIGATION_{pre}$ = 1 if a firm is in a high litigation risk industry and has an earnings decrease of more than 20 percent for at least one year during 1996–1999, and 0 otherwise;
$ISSUANCE_{pre}$ = cumulative proceeds from external equity and debt issuance during 1996–1999, scaled by average total assets over the same period;
ROE_{pre} = industry-median adjusted return on equity (operating income divided by the average of beginning and ending book value of common equity), averaged over 1996–1999;
$SIZE_{pre}$ = natural logarithm of market value of equity, averaged over 1996–1999.

[b] p-values are one-tailed for variables with predicted signs and two-tailed for variables without predicted signs.

[c] The percentage change in odds reflects the effect of a change in the independent variable on the odds of becoming post-FD new nondiscloser instead of post-FD new public discloser. The percentage change in odds for continuous variables is $100[\exp(s_i\beta_i) - 1]$, where s_i is the sample standard deviation of variable i and β_i is the coefficient estimate for the variable. The percentage change in odds for indicator variables is $100[\exp(\beta_i) - 1]$.

Changes in the Magnitude of Price Reactions to Earnings Announcements

For each firm I estimate abnormal returns using a market model.[36] I calculate the mean absolute cumulative abnormal returns compounded from one day before to two days after each earnings announcement (*ACAR*) for quarters in the pre-FD period, and separately for quarters in the post-FD period. I then compute changes in average *ACAR* between the post-FD and the pre-FD periods ($\Delta\overline{ACAR}_{post-pre}$). Equation (8.1) tests for cross-sectional differences in changes in the magnitude of price reactions to earnings announcements. I expect post-FD new nondisclosers to have larger increases in the magnitude of price reactions to their earnings announcements than: (1) post-FD new public disclosers ($\delta_1 - \delta_2 > 0$), and (2) pre-FD public disclosers ($\delta_1 > 0$).

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[36] I estimate the market model parameters using a value-weighted market return over a 200-day period ending 31 trading days before the earnings announcement. The abnormal return is the actual return on each day minus the expected return estimated by applying the market model parameters.

$$\begin{aligned}\Delta\overline{ACAR}_{post-pre} = \delta_0 &+ \overset{(+)}{\delta_1 PostFD\_NewNon} + \overset{(?)}{\delta_2 PostFD\_NewPublic}\\ &+ \overset{(+)}{\delta_3\Delta(Std\Delta EPS)_{post-pre}} + \overset{(+)}{\delta_4\Delta Losses_{post-pre}} + \mu.\end{aligned} \tag{8.1}$$

Equation (8.1) controls for two other (non-disclosure related) factors that could affect changes in the magnitude of price reactions to earnings announcements. First, I control for changes in earnings volatility because more volatile earnings reduce earnings predictability, which in turn leads to larger price reactions to earnings announcements (Heflin et al. 2003). I measure changes in earnings volatility as the standard deviation of seasonal changes in earnings per share in the post-FD period minus the standard deviation of seasonal changes in earnings per share in the pre-FD period ($\Delta(Std\Delta EPS_{post-pre})$). I expect $\Delta(Std\Delta EPS)_{post-pre}$ to be positively associated with $\Delta\overline{ACAR}_{post-pre}$. Second, I control for changes in the incidence of losses because the market has difficulty predicting earnings of loss firms (Basu et al. 1996; Heflin et al. 2003). I measure changes in the incidence of losses as the difference in the proportion of loss quarters between the post-FD period and the pre-FD period ($\Delta Losses_{post-pre}$). I expect the coefficient on $\Delta Losses_{post-pre}$ to be positive.

Changes in the Number of Analysts Following the Firm

Equation (8.2) tests for cross-sectional differences in changes in analyst following, measured as the difference in the mean number of analysts providing annual earnings forecasts for the firm between the post-FD period and the pre-FD period ($\Delta\overline{AF}_{post-pre}$) (Lang and Lundholm 1996). I expect post-FD new nondisclosers to experience steeper decreases in analyst following than: (1) post-FD new public disclosers ($\delta_1 - \delta_2 < 0$), and (2) pre-FD public disclosers ($\delta_1 < 0$). Equation (8.2) also controls for changes in the incidence of losses ($\Delta Losses_{post-pre}$) because McNichols and O'Brien (1997) suggest that analysts are more likely to drop firms whose performance deteriorates. Thus, I expect a negative coefficient on $\Delta Losses_{post-pre}$.

$$\begin{aligned}\Delta\overline{AF}_{post-pre} = \delta_0 &+ \overset{(-)}{\delta_1 PostFD\_NewNon} + \overset{(?)}{\delta_2 PostFD\_NewPublic}\\ &+ \overset{(-)}{\delta_3\Delta Losses_{post-pre}} + \mu.\end{aligned} \tag{8.2}$$

Changes in Analysts' Annual Forecast Errors and Forecast Dispersion

Equations (8.3) and (8.4) test for cross-sectional differences in the changes in analysts' consensus forecast errors and forecast dispersion. I measure analyst forecast errors as the absolute value of the difference between actual annual earnings per share and the mean analyst forecast,[37] scaled by share price at the end of the year (Heflin et al. 2003). Change in analyst forecast errors is the difference between the absolute forecast errors averaged over the post-FD period and the absolute forecast errors averaged over the pre-FD period ($\Delta|\overline{FE}|_{post-pre}$). I measure analyst forecast dispersion as the standard deviation of individual analysts' annual earnings forecasts, scaled by share price at the end of the year. Changes in analyst forecast dispersion is then the difference between the standard deviation of analyst forecasts averaged over the post-FD period and the standard deviation of analyst forecasts averaged over the pre-FD period ($\Delta\overline{Disp}_{post-pre}$).[38] I expect post-FD new nondisclosers to have larger increases in analyst forecast errors and forecast dispersion than: (1) post-FD new public disclosers ($\delta_1 - \delta_2 > 0$), and (2) pre-FD public disclosers ($\delta_1 > 0$).

$$\begin{aligned}\Delta|\overline{FE}|_{post-pre} = {} & \delta_0 + \overset{(+)}{\delta_1 PostFD\_NewNon} + \overset{(?)}{\delta_2 PostFD\_NewPublic} \\ & + \overset{(+)}{\delta_3 \Delta(Std\Delta EPS)_{post-pre}} + \overset{(+)}{\delta_4 \Delta Losses_{post-pre}} + \mu; \end{aligned} \tag{8.3}$$

$$\begin{aligned}\Delta\overline{Disp}_{post-pre} = {} & \delta_0 + \overset{(+)}{\delta_1 PostFD\_NewNon} + \overset{(?)}{\delta_2 PostFD\_NewPublic} \\ & + \overset{(+)}{\delta_3 \Delta(Std\Delta EPS)_{post-pre}} + \overset{(+)}{\delta_4 \Delta Losses_{post-pre}} + \mu. \end{aligned} \tag{8.4}$$

I control for changes in earnings volatility because more volatile earnings reduce earnings predictability, which in turn leads to less accurate analyst forecasts (Butler and Lang 1991) and higher forecast dispersion (Lang and Lundholm 1996). Finally, I control for changes in the incidence of losses because analysts have more difficulty predicting earnings of loss firms and therefore have higher dispersion (Basu et al. 1996; Heflin et al. 2003).[39] Thus, I expect the coefficients on $\Delta(Std\Delta EPS)_{post-pre}$ and $\Delta Losses_{post-pre}$ to be positive. Figure 2 summarizes the coefficients of interest and their predicted signs.[40]

Results of Testing H3

Panel A of Table 6 reports descriptive statistics for the variables I use to test cross-sectional differences in the changes in firms' information environments. On average, the four-day absolute cumulative abnormal returns around earnings announcements increase by 0.5 percent after Reg FD for the sample as a whole.[41] Mean analyst following decreases

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[37] Using the I/B/E/S Detail History file, I construct the mean analyst forecast from the most recent annual EPS forecast each analyst provides. I also use the actual EPS reported in I/B/E/S for consistency.

[38] I construct the standard deviation of analyst forecasts from the most recent annual EPS forecast each analyst provides for each year using data from the I/B/E/S Detail History file.

[39] I winsorize all continuous variables at the top and bottom 1 percent of their distributions.

[40] In untabulated sensitivity analyses, I estimate an alternative specification of these post-FD consequences tests. Specifically, I estimate a fixed-effects model using firm-year observations (firm-quarter observations for the market reaction test) with a *PostFD* dummy variable interacting with firm classification. I also control for the unexpected macroeconomic decline and shocks following Agrawal et al. (2006), who measure economic decline through a dummy variable (equals 1 if annual earnings decrease, and 0 otherwise) and unexpected shock as the absolute changes in annual earnings scaled by price. My inferences remain the same as those based on firm-level averages analyses.

[41] Most prior research has found that, on average, price reactions to earnings announcements decline shortly after Reg FD (Bailey et al. 2003; Heflin et al. 2003; Eleswarapu et al. 2004; Shane et al. 2001). When I shorten my sample period to three quarters before and three quarters after Reg FD, which is more comparable to the short sample periods used in most prior research, I also find a decrease in the cross-sectional average price reactions to earnings announcements. But as Bailey et al. (2003) point out, this decrease is likely an artifact of the major stock exchanges' switch to decimalization.

FIGURE 2
Comparison Groups, Coefficients of Interest, and Predicted Signs

Comparison Groups	**Coefficient(s) of Interest**	**Predicted Sign** $\Delta\overline{ACAR}_{post-pre}$	**Predicted Sign** $\Delta\overline{AF}_{post-pre}$	**Predicted Sign** $\Delta\overline{|FE|}_{post-pre}$	**Predicted Sign** $\Delta\overline{Disp}_{post-pre}$
Post-FD New Nondisclosers versus Pre-FD Public Disclosers	δ_1	+	–	+	+
Post-FD New Nondisclosers versus Post-FD New Public Disclosers	$\delta_1 - \delta_2$	+	–	+	+
Post-FD New Public Disclosers versus Pre-FD Public Disclosers	δ_2	?	?	?	?
Post-FD New Public Disclosers	$\delta_0 + \delta_2$	?	?	?	?

by about 1 after Reg FD for the sample as a whole. Both the magnitude of analyst forecast errors and forecast dispersion increase after Reg FD.[42] The standard deviation of seasonal changes in earnings per share and the incidence of losses also increase after Reg FD, so it is important to control for these increases in the difficulty of predicting earnings when testing for changes in firms' information environments.

Panels B through E of Table 6 present results of the multiple regressions.[43] Panel B reports the analysis of cross-sectional differences in the changes in the magnitude of price reactions to earnings announcements ($\Delta\overline{ACAR}_{post-pre}$). Consistent with H3a, the coefficient on *PostFD_NewNon* (δ_1) and the difference in the coefficients on *PostFD_NewNon* and *PostFD_NewPublic* ($\delta_1 - \delta_2$) are significantly positive ($p \leq 0.01$). The magnitudes of the coefficients indicate that post-FD new nondisclosers experience larger increases in the magnitude of price reactions to their earnings announcements than either pre-FD public disclosers or post-FD new public disclosers (by 1.0 percent and 1.1 percent of share prices, respectively). The insignificant coefficient on *PostFD_NewPublic* (δ_2) ($p = 0.855$) indicates that there are no significant differences in the changes in the magnitude of price reactions to earnings announcements between post-FD new public disclosers and pre-FD public disclosers. The sum of δ_0 and δ_2 is also insignificant ($p = 0.876$), suggesting no significant changes in the magnitude of price reactions to earnings announcements for post-FD new public disclosers. These latter findings are important because they suggest that, after Reg FD, post-FD new public disclosers replace private disclosure with public disclosure that is sufficiently informative to prevent deterioration of their information environments.

Finally, the intercept (δ_0) is insignificant ($p = 0.935$), suggesting that pre-FD public disclosers experience no significant change in the magnitude of price reactions to their earnings announcements after controlling for changes in earnings volatility and changes in the incidence of losses. This result is consistent with my maintained hypothesis that Reg FD should have little effect on firms that primarily used public disclosure before Reg FD.

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[42] These results are consistent with Agrawal et al. (2006) who find that, on average, analyst forecast errors and dispersion increase after Reg FD, but are inconsistent with Heflin et al. (2003) who find no significant changes in either analyst forecast errors or forecast dispersion. The main reason for the differences between the two studies is that Heflin et al. (2003) examine a short sample period (three quarters pre- and three quarters post-FD), whereas Agrawal et al. (2006) look at a nearly ten-year pre- and post-FD period. Because my study also adopts the longer-term perspective, it is not surprising that my findings are more consistent with Agrawal et al. (2006) than with Heflin et al. (2003).

[43] Although I could not reject the null of no heteroscedasticity, inferences remain the same when p-values are based on White standard errors.

TABLE 6
Tests of Cross-Sectional Differences in the Changes in Firms' Information Environments around Reg FD (H3a–H3d)

Panel A: Descriptive Statistics on Changes in Measures of Firms' Information Environments and Control Variables after Reg FD

Variable[a]	n	Mean	Std. Dev.	Median
$\Delta ACAR_{post-pre}$	688	0.005	0.042	−0.002
$\Delta AF_{post-pre}$	695	−0.950	5.657	−1.250
$\Delta\lvert FE\rvert_{post-pre}$	613	0.221	1.928	0.001
$\Delta Disp_{post-pre}$	568	0.060	0.413	0.002
$\Delta(Std\Delta EPS)_{post-pre}$	691	0.203	1.686	0.012
$\Delta Losses_{post-pre}$	691	0.154	0.316	0.063

Panel B: OLS Analysis of Cross-Sectional Differences in the Changes in the Magnitude of Price Reactions to Earnings Announcements (H3a)

$$\Delta\overline{ACAR}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3\Delta(Std\Delta EPS)_{post-pre} + \delta_4\Delta Losses_{post-pre} + \mu$$

Variable[a] (n = 685)	Predicted Sign	Coefficient Estimate	p-value[b]
Intercept (δ_0)		0.000	0.935
PostFD_NewNon (δ_1)	+	0.010	0.005
PostFD_NewPublic (δ_2)	?	−0.001	0.855
$\Delta(Std\Delta EPS)_{post-pre}$ (δ_3)	+	0.009	<0.001
$\Delta Losses_{post-pre}$ (δ_4)	+	0.000	0.056

Test Results for $\delta_1 - \delta_2 > 0$: F-value: 5.31 Pr > F: 0.011
Test Results for $\delta_0 + \delta_2 = 0$: F-value: 0.02 Pr > F: 0.876
Adj. R^2 = 7.49%

Panel C: OLS Analysis of Cross-Sectional Differences in the Changes in Analyst Following (H3b)

$$\Delta\overline{AF}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3\Delta Losses_{post-pre} + \mu$$

Variable[a] (n = 690)	Predicted Sign	Coefficient Estimate	p-value[b]
Intercept (δ_0)		−0.438	0.106
PostFD_NewNon (δ_1)	−	−1.719	<0.001
PostFD_NewPublic (δ_2)	?	1.351	0.007
$\Delta Losses_{post-pre}$ (δ_3)	−	−0.025	<0.001

Test Results for $\delta_1 - \delta_2 < 0$: F-value: 25.99 Pr > F: < 0.001
Test Results for $\delta_0 + \delta_2 = 0$: F-value: 4.27 Pr > F: 0.039
Adj. R^2 = 5.76%

(*continued on next page*)

TABLE 6 (continued)

Panel D: OLS Analysis of Cross-Sectional Differences in the Changes in Analyst Forecast Errors (H3c)

$$\Delta|\overline{FE}|_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3\Delta(Std\Delta EPS)_{post-pre} + \delta_4\Delta Losses_{post-pre} + \mu$$

Variable[a] (n = 613)	Predicted Sign	Coefficient Estimate	p-value[b]
Intercept (δ_0)		0.034	0.284
PostFD_NewNon (δ_1)	+	0.206	0.001
PostFD_NewPublic (δ_2)	?	−0.021	0.717
$\Delta(Std\Delta EPS)_{post-pre}$ (δ_3)	+	0.212	<0.001
$\Delta Losses_{post-pre}$ (δ_4)	+	0.002	0.011

Test Results for $\delta_1 - \delta_2 > 0$: F-value: 8.93 Pr > F: 0.002
Test Results for $\delta_0 + \delta_2 = 0$: F-value: 0.06 Pr > F: 0.800
Adj. $R^2 = 15.62\%$

Panel E: OLS Analysis of Cross-Sectional Differences in the Changes in Analyst Forecast Dispersion (H3d)

$$\Delta\overline{Disp}_{post-pre} = \delta_0 + \delta_1 PostFD\_NewNon + \delta_2 PostFD\_NewPublic + \delta_3\Delta(Std\Delta EPS)_{post-pre} + \delta_4\Delta Losses_{post-pre} + \mu$$

Variable[a] (n = 568)	Predicted Sign	Coefficient Estimate	p-value[b]
Intercept (δ_0)		0.014	0.195
PostFD_NewNon (δ_1)	+	0.073	0.001
PostFD_NewPublic (δ_2)	?	0.006	0.753
$\Delta(Std\Delta EPS)_{post-pre}$ (δ_3)	+	0.121	<0.001
$\Delta Losses_{post-pre}$ (δ_4)	+	0.000	0.390

Test Results for $\delta_1 - \delta_2 > 0$: F-value: 6.11 Pr > F: 0.007
Test Results for $\delta_0 + \delta_2 = 0$: F-value: 1.36 Pr > F: 0.243
Adj. $R^2 = 28.92\%$

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[a] Variable definitions:
$\Delta ACAR_{post-pre}$ = difference in the average absolute cumulative abnormal returns from one day before to two days after quarterly earnings announcements between the post-FD period and the pre-FD period;
$\Delta AF_{post-pre}$ = difference in the mean number of analysts providing annual earnings forecasts between the post-FD period and the pre-FD period;
$\Delta|FE|_{post-pre}$ = difference between the post-FD period and the pre-FD period in the average absolute annual forecast errors scaled by share price at the end of the year;
$\Delta Disp_{post-pre}$ = difference between the post-FD period and the pre-FD period in the average analyst annual forecast dispersion scaled by share price at the end of the year;
$\Delta(Std\Delta EPS)_{post-pre}$ = difference in the standard deviation of seasonal changes in earnings per share between the post-FD period and the pre-FD period;
$\Delta Losses_{post-pre}$ = difference in the proportion of loss quarters between the post-FD period and the pre-FD period;
PostFD_NewNon = 1 for post-FD new nondisclosers, and 0 otherwise; and
PostFD_NewPublic = 1 for post-FD new public disclosers, and 0 otherwise.

[b] p-values are one-tailed for variables with predicted signs and two-tailed for variables without predicted signs.

Also as expected, changes in the magnitude of price reactions to earnings announcements increase with both $\Delta(Std\Delta EPS)_{post-pre}$ and $\Delta Losses_{post-pre}$ ($p < 0.001$ and $p = 0.056$).

Panel C of Table 6 reports results on the cross-sectional differences in the changes in analyst following. Consistent with H3b, the coefficient on *PostFD_NewNon* (δ_1) and the difference in the coefficients on *PostFD_NewNon* and *PostFD_NewPublic* ($\delta_1 - \delta_2$) are significantly negative ($p < 0.001$). The magnitudes of the coefficients indicate that post-FD new nondisclosers have steeper decreases in analyst following relative to either pre-FD public disclosers or post-FD new public disclosers (by 1.72 and 3.07 analysts, respectively). Both the coefficients on *PostFD_NewPublic* (δ_2) and the sum of δ_0 and δ_2 are positive and significant ($p \leq 0.04$). Thus, post-FD new public disclosers enjoy an *increase* (by 1.35 and 0.91 analysts, respectively) in analyst following relative to: (1) pre-FD public disclosers, and (2) their own pre-FD level of analyst following. This evidence is important because it indicates improvement in one element of these firms' information environments (i.e., Reg FD has one desired effect on the post-FD new public disclosers). The intercept (δ_0) is insignificant ($p = 0.106$), indicating that pre-FD public disclosers experience no significant changes in analyst following, after controlling for changes in the incidence of losses. Finally, the coefficient on $\Delta Losses_{post-pre}$ is negative ($p < 0.001$), consistent with analysts dropping coverage of poorly performing firms.

Panels D and E of Table 6 present the results on cross-sectional differences in the changes in analyst forecast errors and forecast dispersion. Consistent with H3c and H3d, the coefficients on *PostFD_NewNon* (δ_1) and the differences in the coefficients on *PostFD_NewNon* and *PostFD_NewPublic* ($\delta_1 - \delta_2$) are positive ($p < 0.01$ in Panel D and Panel E, respectively). These results suggest that post-FD new nondisclosers have larger increases in analyst forecast errors (by 20.6 percent and 22.7 percent, respectively) and larger increases in forecast dispersion (by 7.3 percent and 6.7 percent, respectively) than either pre-FD public disclosers or post-FD new public disclosers. On the other hand, there is no evidence of deterioration in post-FD new public disclosers' information environments. Post-FD new public disclosers experience no significant increases in analyst forecast errors or forecast dispersion relative to: (1) pre-FD public disclosers (δ_2) ($p = 0.717$ and $p = 0.753$), and (2) their own pre-FD levels ($\delta_0 + \delta_2$) ($p = 0.800$ and $p = 0.243$). The insignificant intercepts (δ_0) indicate no significant changes in analyst forecast errors or forecast dispersion for pre-FD public disclosers after Reg FD ($p = 0.284$ and $p = 0.195$), after controlling for changes in earnings volatility and changes in the incidence of losses. This is again consistent with Reg FD having little effect on these firms. Finally, changes in the magnitude of analyst forecast errors increase with both $\Delta(Std\Delta EPS)_{post-pre}$ and $\Delta Losses_{post-pre}$ ($p \leq 0.01$), while changes in analyst forecast dispersion increase with $\Delta(Std\Delta EPS)_{post-pre}$ ($p < 0.001$).

VII. CONCLUSIONS

This study capitalizes on publicly available data to develop a new measure of private earnings guidance. Relying on the new measure and theory, I investigate why some firms relied more on private earnings guidance to analysts instead of providing public earnings guidance in the first place. Consistent with theory, I find that firms my measure classifies as relying more on private earnings guidance before Reg FD (i.e., pre-FD private disclosers) have higher proprietary information costs and their earnings-related information has higher information transfer value for analysts than firms that relied more on public earnings guidance before Reg FD (i.e., pre-FD public disclosers).

I next use theory to develop hypotheses about determinants of cross-sectional differences in pre-FD private disclosers' responses when disclosure regulation (i.e., Reg FD) imposes an exogenous shock on their disclosure policies by prohibiting further private disclosure to analysts. Consistent with predictions from theoretical disclosure research, I find that pre-FD private disclosers that have lower information asymmetry and higher proprietary information costs are more likely to choose a post-Reg FD disclosure policy that is inconsistent with the intent of the regulation—replacing private disclosure with *nondisclosure* rather than with public disclosure.

Finally, I document new cross-sectional differences in the economic consequences of Reg FD. The economic consequences of Reg FD depend on how the firms targeted by Reg FD—the pre-FD private disclosers—change their disclosure policies. I find that roughly half the firms classified as pre-FD private disclosers replace private disclosure with nondisclosure. These firms experience economically significant deterioration in their information environments, including larger increases in the magnitude of price reactions to earnings announcements, steeper decreases in analyst coverage, and larger increases in analyst forecast errors and dispersion, relative to: (1) firms that replace private earnings guidance with public guidance, and (2) firms that primarily relied on public earnings guidance even before Reg FD. In contrast, pre-FD private disclosers that replace private earnings guidance with public disclosure experience no significant deterioration in their information environments, suggesting that they replace pre-FD private disclosures with post-FD new public disclosures that are approximately equally informative.

This study's results offer new evidence on the rationale for private guidance to analysts. The new measure of private earnings guidance developed in this study makes it possible to focus on the firms targeted by Reg FD, and to use theory to predict cross-sectional differences in how these targeted firms respond to the exogenous shock imposed by the regulation. That is, unlike prior research that examines the average effects of Reg FD over a broad sample of firms, this study identifies the firms most affected by Reg FD, and then uses theory to predict how and why these firms differ in the way they change their disclosure policies in response to Reg FD.

With a narrowed focus on the firms targeted by Reg FD, this study also provides sharper tests of the economic consequences of the regulation. In particular, this study documents that negative, unintended consequences of Reg FD do occur, but are concentrated in the subset of firms that: (1) are the primary targets of Reg FD—the pre-FD private disclosers, and (2) find the prospect of replacing private disclosure to analysts with public disclosure too costly (i.e., those private disclosers with high proprietary information costs and low information asymmetry). My evidence that firms' responses to disclosure regulation are, on average, consistent with theory, and that predictable cross-sectional differences in the way firms change their disclosure policies lead to differential economic consequences, can help regulators anticipate how new disclosure regulations will affect different firms' disclosure policies. Policymakers armed with a better understanding of the differences in the way firms respond to disclosure regulation, particularly responses that are likely to lead to unintended negative consequences on firms' information environments, can better decide how to evaluate existing and future disclosure regulations.

APPENDIX

ADDITIONAL EVIDENCE SUPPORTING THE VALIDITY OF FIRM CLASSIFICATION BASED ON THE PRIVATE EARNINGS GUIDANCE MEASURE

Because private earnings guidance is by definition unobservable, my classification of firms as public disclosers, private disclosers, and nondisclosers undoubtedly has measurement error. This appendix summarizes the evidence that collectively validates that my classification provides a reasonable first approximation of this unobservable construct. First, Section II of the text provides evidence that validates my classification's distinction between pre-FD private disclosers and pre-FD nondisclosers. Specifically, I show that characteristics of firms I identify as pre-FD private disclosers (pre-FD nondisclosers) are similar to those Hutton (2005) expects and finds in her sample of private guidance firms (no guidance firms) identified based on proprietary self-reported NIRI survey data.

Second, Section IV of the text provides evidence that validates my classification's distinction between pre-FD private disclosers and pre-FD public disclosers. The tests of firms' decisions between private guidance versus public guidance reported in Table 3 are joint tests of the theory and the validity of my classification. Thus, empirical results supporting the hypothesis also support the validity of my classification. Third, as reported in Section III (footnote 22), I find that after Reg FD became effective, firms I classify as pre-FD private disclosers change their public disclosure rates more relative to: (1) changes in their own public disclosure rates within the *pre-FD* period, and (2) changes in public disclosure rates of firms less affected by Reg FD (i.e., the pre-FD public disclosers). Fourth, as reported in Table 6, I find that Reg FD has little effect on the information environments of firms I classify as pre-FD public disclosers, consistent with my classification appropriately identifying this group of firms that should be relatively unaffected by Reg FD.

Because my classification is based on both the private guidance measure and firms' public disclosure rates, I conduct the fifth and sixth analyses to demonstrate that my classification does more than simply sort firms based on their average public disclosure rates. The fifth analysis provides evidence that public disclosure rates are not the primary driver of my bifurcation between pre-FD private disclosers and pre-FD nondisclosers. Specifically, to ensure that differences in firms' public disclosure rates are not the primary driver of the similarity between characteristics of firms I identify as pre-FD private disclosers (pre-FD nondisclosers) and Hutton's (2005) results, I sort my entire set of sample firms based on *only* their average public disclosure rates (from high to low). I denote firms in the top third of the distribution as pseudo-public disclosers, those in the middle third as pseudo-private disclosers, and those in the bottom third as pseudo-nondisclosers, so this pseudo-classification is purely a function of firms' public disclosure rates. Then I rerun the Hutton-like logit model on this pseudo-classification of private disclosers and nondisclosers. If this pseudo-classification effectively captures my original classification, then I would find similar results to those reported in Table 2. To the contrary, however, in this pseudo-classification based only on public disclosure rates, I find that only one variable (number of segments) has the same sign and significance level as Hutton's findings in Table 2 (results are untabulated). This result confirms that my classification captures more than just firms' public disclosure rates.[44]

To confirm that my bifurcation between pre-FD private disclosers and pre-FD public disclosers is not merely an artifact of sorting on public disclosure rates, my sixth analysis reruns the test of firms' choice between private and public disclosure (H1; Table (3) after controlling for the average number of public disclosures. This sensitivity test throws out "part of the baby with the bathwater" because the classification of public disclosers is partly based on firms' public disclosure rates (in addition to the measure of private guidance). Nonetheless, even after controlling for the number of public disclosures (and thereby controlling away part of the effect of interest), the results (untabulated) continue to support H1. Specifically, the coefficients on $R\&D_{pre}$ and information transfer value ($TRANSFER_{pre}$) are still positive and significant, albeit the significance levels are somewhat weaker ($p < 0.06$).

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[44] An alternative way to demonstrate that my classification is not purely a function of firms' public disclosure rates is to control for the number of public disclosures in the Hutton-like logit model. One caveat is that this approach throws out "part of the baby with the bathwater" because the classification of nondisclosers is based partly on firms' (lack of) public disclosure. Another caveat is that Hutton's (2005) original model does not control for the number of public disclosures, so estimation of such a *modified* Hutton-like logit model is not completely comparable to Hutton's (2005) findings. In any event, I rerun the Hutton-like logit in Table 2 after controlling for the number of public disclosures. To the extent that the results survive addition of this control, this test would demonstrate that my classification is not simply sorting on the rate of public disclosure. Indeed, I find that four of the six variables that were originally significant—number of analysts, external financing, industry ERC R^2, and variability of revenues—remain significant in the expected directions (results are untabulated), further supporting that my classification is doing more than simply sorting on public disclosure rate.

Seventh, one possible subset of observations that might be subject to measurement error is firm-quarters classified as providing upward total guidance using Matsumoto's (2002) model, but where actual earnings fell short of the analysts' forecast. However, this applies to only 6 percent of my sample firm-quarters. Eliminating these firm-quarters has little effect on my classification—the resulting classification is highly correlated with the classification used in the main analysis reported here ($\rho = 0.96$). Eighth, the classification is robust to a number of modifications to the details of the specification, as noted in footnotes 12, 13, 33, and in the next section of this Appendix. Ninth, using the *ranks* of the private earnings guidance measure to classify firms helps mitigate the effect of any extreme values of the private guidance measure. Finally, measurement error that is noise in the classification simply biases against the hypotheses.[45]

Robustness of Firm Classification Based on Private Earnings Guidance Measure under Modified Model Specification

I examine the robustness of my classification of firms to modifications of the model specification for the private earnings guidance measure. When Matsumoto (2002) estimates the expected analyst forecast ($E[F]$) absent earnings guidance, she also controls for firm-specific daily excess returns cumulated from three days after the year $t-1$ quarter q earnings announcement to 20 days before the year t quarter q earnings announcement ($CRET$) to account for other information that analysts use to predict earnings. To the extent that $CRET$ already incorporates firm-specific earnings guidance given during the cumulation period, the measure of expected analyst forecast ($E[F]$) may not be free of earnings guidance as intended. So I replace firm-specific cumulative daily excess returns with the industry average cumulative daily excess returns from three days after firm i's year $t-1$ quarter q earnings announcement to 20 days before the firm's year t quarter q earnings announcement after excluding firm i, to estimate the expected analyst forecast for the firm. The resulting firm classification controlling for industry average cumulative daily excess returns, and the original classification based on firm-specific cumulative daily excess returns ($CRET$) have a correlation of 0.92, indicating that the classification is robust to firm-specific versus industry level measures of $CRET$.[46]

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[45] One might also expect that pre-FD private disclosers should experience a decline in the private earnings guidance measure after Reg FD. In untabulated sensitivity analyses I find that indeed pre-FD private disclosers experience decreases in the raw values of the "private guidance measure" in the years 2002–2003 (i.e., the period after Reg FD had time to become effective, and after the dot.com bust and 9/11 macroeconomic shocks that affected the predictability of earnings) relative to the 1996–1999 pre-FD period. Although comforting, I view this evidence as less convincing in validating the private guidance measure because economy-wide changes between the pre- and post-FD periods have changed the way that analysts function/operate (Mohanram and Sunder 2006).

[46] As an alternative control for earnings predictability in the private earnings guidance model (Equation (5), I also use the standard deviation of earnings per share instead of $Std\Delta EPS$. The classifications based on these two measures have a correlation of 0.96.

Collectively, I view the evidence reported in the text and the Appendix as supporting the validity of my classification based on the private earnings guidance measure. While this evidence suggests that my measure provides a reasonable first approximation of an unobservable yet important construct, the private earnings guidance measure (like any empirical proxy) undoubtedly contains measurement error. Future research can further refine this measure when investigating other questions related to private earnings guidance.

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Accruals, Investment, and the Accrual Anomaly

X. Frank Zhang
Yale University

ABSTRACT: This paper investigates two competing hypotheses for the accrual anomaly: investment/growth and persistence. Both investment/growth and persistence information in accruals are likely to vary cross-sectionally, depending on a firm's business model, a fact that generates different cross-sectional implications for the accrual anomaly. I find that the magnitude of the accrual anomaly monotonically increases with the investment information contained in accruals, as measured by the co-variation between accruals and employee growth. In industries/firms in which accruals co-vary with employee growth, accruals show strong predictive power for future stock returns. In industries/firms in which accruals show little correlations with employee growth, the accrual anomaly is much weaker. In contrast, the evidence from the cross-sectional analysis is inconsistent with the persistence argument. From the earnings perspective, the evidence on one-year-ahead earnings growth is inconclusive, but the results on longer-term earnings growth support the investment argument but not the persistence argument. Collectively, I conclude that these results support the view that the accrual anomaly is attributable to the fundamental investment information contained in accruals.

Keywords: *accruals; investment; persistence; accrual anomaly; earnings management.*

JEL Classification: *G12, G14, M41.*

I. INTRODUCTION

It has long been recognized that accruals, as a component of earnings, are less persistent than cash flows (Sloan 1996). The lower persistence of accruals is often attributed to the subjectivity of accrual measures (Richardson et al. 2004, 2005; Hirshleifer et al.

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2005). This paper investigates another property of accruals—their ability to capture fundamental investment/growth in working capital.[1] Traditionally, the accounting literature measures accruals as changes in working capital.[2] Like investment in fixed assets, changes in working capital represent one form of investment and are an integral part of a firm's business growth. Economically, investing in working capital should co-vary with other growth-related business activities, such as hiring new employees, issuing new debt and equity, and investing in fixed assets in order to support corporate growth. Investment in working capital should also be positively related to the outcomes of firms' investment activities (e.g., actual sales) if investment is, on average, optimal. I find that accruals co-vary strongly with other growth attributes, such as growth in the number of employees, external financing, and cash sales growth, suggesting that accruals, at least partially, capture fundamental investment information.

Both persistence and investment information contained in accruals are likely to vary cross-sectionally, depending on a firm's business Model (i.e., its production function). In this paper, I test different implications of persistence and investment in the context of the accrual anomaly, which is first documented in Sloan (1996). While there is a general consensus that accruals are negatively related to future stock returns, the interpretation of this phenomenon is more controversial. Sloan (1996) and a large body of follow-up studies follow the persistence story, arguing that investors tend to overestimate the persistence of accruals and underestimate the persistence of cash flows when forming earnings expectations.[3] As a result, stock returns are systematically lower when realized earnings are less than expected for high-accrual firms. Alternatively, Fairfield et al. (2003) interpret accruals as growth in short-term net operating assets and argue that the accrual anomaly is a special case of a more general anomaly based on growth in net operating assets. Lakonishok et al. (1994) and Titman et al. (2004) show that investment/growth is negatively related to future stock returns. The issue of whether investment/growth or persistence explains the accrual anomaly is controversial because persistence and growth have the same prediction for the relation between accruals and future stock returns. From the evidence in the prior literature, we cannot distinguish one explanation from the other.

This paper advances our understanding of the underlying cause of the accrual anomaly by examining cross-sectional variation in the anomaly based on a firm's business model. One key feature of my approach is its reliance on employee growth, which is not an outcome of the financial reporting system and thus is not related to the accounting-based persistence argument. By focusing on the different information content of accruals across industries/firms, my approach generates different cross-sectional implications based on investment and persistence, a fact that allows me to distinguish between these two competing views. While investment and persistence are not mutually exclusive for the accrual anomaly, my goal is to test which factor is more dominant.

Under the investment argument, accruals capture fundamental investment in working capital, which co-varies with employee growth and other growth attributes of the firm. The investment/growth information contained in accruals predicts future stock returns. Under the persistence argument, accruals, as a component of earnings, are less persistent than cash flows, and investors misestimate accruals' persistence. The lower persistence of accruals relative to cash flows explains future stock returns. The investment and persistence information contained in accruals varies cross-sectionally, depending on a firm's business model. If in some industries/firms accruals co-vary strongly with employee growth, then accruals are more likely to capture fundamental investment information than to reflect subjective estimates of assets and liabilities that are going to reverse in the next year. A testable implication of the investment argument is that the accrual anomaly is stronger for industries/firms in which accruals co-vary strongly with employee growth. Similarly, if accrual persistence is industry- or firm-specific based on the type of business model employed by the firm, then the persistence argument suggests a stronger accrual anomaly for industries/firms with less persistent accruals.

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[1] By fundamental investment, I mean investment associated with positive expected net present values in a firm's business.

[2] Accruals based on the statement of cash flows measure organic growth in working capital; while accruals based on the balance sheet measure both organic growth and growth via mergers and acquisitions.

[3] I use persistence to refer to investors' mispricing of accrual persistence relative to cash flows, and I use persistence and accrual persistence interchangeably in the paper.

Investment and persistence also offer different predictions for future earnings. If accruals capture firms' fundamental investment information and if investment is optimal, on average, then high-accrual firms should have higher earnings in the future, although profitability is likely to be lower due to lower marginal returns to incremental investment. The effect of investment on future earnings could be intermediate or long term, depending on a firm's investment cycle. The cross-sectional implication of the investment argument is that the positive correlation between earnings growth and accruals should be stronger when accruals are more likely to capture investment information. On the other hand, the persistence argument suggests that high-accrual firms should have lower subsequent earnings and that the negative correlation between earnings growth and accruals should be stronger when accruals are the least persistent relative to cash flows.

My empirical evidence supports the investment argument but not the persistence argument. In particular, I find that the accrual anomaly varies across industries/firms in a predictable way based on the co-variation between accruals and employee growth. In industries/firms where accruals co-vary highly with employee growth, accruals have strong predictive power for future stock returns. In industries/firms where accruals do not co-vary with employee growth, the accrual anomaly is much weaker. On the other hand, I find that the magnitude of the accrual anomaly increases with the persistence of accruals relative to cash flows, an outcome going against the persistence argument. Empirical results on subsequent earnings are somewhat mixed. Accruals/growth are negatively related to one-year-ahead earnings growth, probably due to the mean reversal of earnings growth and special items in year *t* earnings. Cross-sectional results on one-year-ahead earnings growth support both the investment and the persistence arguments, making the evidence inconclusive. Longer-term earnings growth increases with accruals, and the increase is stronger when accruals co-vary highly with employee growth, supporting the investment argument. Collectively, I view these results as supporting the idea that the accrual anomaly is largely attributable to the fundamental investment information contained in accruals rather than to the lower persistence of accruals relative to cash flows.

This paper contributes to the accounting literature in several ways. This is the first paper that disentangles accrual persistence from investment/growth in explaining the accrual anomaly. Given the amount of research on the accrual anomaly, it is important to understand its underlying forces. Additionally, the lower future returns for high-accrual firms and the lower persistence of accruals relative to cash flows are widely used to justify the idea that accruals capture earnings quality (see Dechow and Schrand [2004] and papers cited therein). My findings in favor of the investment/growth explanation suggest that we should keep searching for a proxy for earnings quality. Also, my evidence that the investment/growth information contained in accruals goes far beyond that captured by current sales growth has broad implications for accrual-related studies. For example, discretionary accruals based on the Jones or the modified Jones model are likely to capture growth rather than earnings management due to incomplete controls for fundamental investment information in accruals. The long-term underperformance after certain corporate events, such as mergers and acquisitions, IPOs, and SEOs, may be due to high growth of these firms rather than the earnings management so frequently sighted in the literature (see related comments in McNichols 2000). The evidence that discretionary accruals do not reverse in the following years (e.g., Teoh et al. 1998; Shivakumar 2000) further suggests the plausibility of this explanation.

This paper proceeds as follows. The next section reviews prior literature and develops testable hypotheses. Section III describes the sample data and provides evidence on the covariation between accruals and other growth attributes. Section IV presents empirical evidence on cross-sectional variation in the accrual anomaly to test the investment and persistence hypotheses. Section V conducts some robustness checks, and Section VI concludes.

II. PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

This paper is related to two lines of research. The first one considers the information content of accruals and the second one examines the link between accruals and future stock returns.

Prior Literature: The Information Content of Accruals

The accounting literature has long focused on the measurement perspective in studying the information content of accruals by examining the measurement error of cash flows and earnings in capturing a firm's performance. On the one hand, Dechow (1994) and Dechow et al. (1998) argue that accruals mitigate the noise in operating cash flows that arises from exogenous or manipulative variation in firms' working capital levels. Compared to accounting income, operating cash flow is noisy because it incorporates period-to-period variation in working capital assets and liabilities, such as inventory, prepayments, and accounts payable. On the other hand, Sloan (1996) and Richardson et al. (2004) suggest that accruals are more subjective and, therefore, less persistent than cash flows. Sloan (1996) and Bradshaw et al. (2001) show that accruals reverse very quickly. The persistence argument for the accrual anomaly in Sloan (1996) and many follow-up studies is derived from this measurement perspective of accruals.

Building on the measurement perspective, accrual models typically capture short-term accrual reversal in estimating "normal" accruals. For example, Dechow and Dichev (2002) measure accruals as a function of past, current, and future cash flows. In earnings management studies, the popular Jones (1991) model measures accruals as a function of revenue changes and gross property, plant, and equipment on the premise that working capital accounts, such as accounts receivable, are proportionate to revenues and that depreciation expense is directly calculated from gross property, plant, and equipment.

Surprisingly, little is known in the literature about the investment perspective of accruals despite the fact that, by definition, accruals measure investment in working capital. The investment perspective of accruals is related to their long-term smoothing role in earnings over firms' business and life cycles, a property that is distinguished from accruals' short-term role of mitigating cash flow noise. Take a firm's life cycle as an example. The sum of accruals (changes in working capital) is zero over a firm's life. Accrual accounting smoothes earnings by recognizing higher earnings than cash flows at the growth stage and lower earnings than cash flows at the maturity stage (e.g., Stickney et al. 2003). Like employee growth, changes in working capital are closely related to the firm's business stage.[4] During expansions, firms increase their production capacity and build up inventory, which often leads to positive accruals. In contractions, firms often dispose of inventory at a discount, write off accounts receivable, and stretch out payments on payables, which often leads to negative accruals. The long-term smoothing role of accruals is critical in accrual accounting. If the short-term smoothing role is the only objective of the accounting system, it could be easily achieved by measuring earnings as a moving average of operating cash flows. In this way, changes in working capital still exist, but they are not called accruals, nor do they pose any persistence or measurement problem.

Prior Literature: The Accrual Anomaly

The second line of research examines the link between accruals and future stock returns. In an influential paper, Sloan (1996) shows that accruals are negatively related to future stock returns, a relationship well-known as the accrual anomaly. He suggests that investors tend to overestimate the persistence of accruals when forming earnings expectations only to be systematically surprised when realized earnings are less than expected for high-accrual firms.

While the literature largely follows the persistence argument for the accrual anomaly, the evidence in Desai et al. (2004) and Fairfield et al. (2003) suggests that the accrual anomaly might be related to growth. Desai et al. (2004) study whether the accrual anomaly is related to the value-glamour anomaly in the finance literature and find that cash flow from operations scaled by stock price captures both anomalies. Fairfield et al. (2003) interpret accruals as growth in short-term net operating assets and find a similar stock anomaly for long-term net operating assets. They argue that growth in net operating assets increases the denominator of the profitability measure (return on assets), but investors do not understand the implication of growth in net operating assets for future profitability.[5] Richardson et al. (2004, 2005) dispute Fairfield et al.'s (2003) conjecture and argue that both traditional accruals and growth in long-term net operating assets are measured with a high degree of subjectivity (lower persistence) and, therefore, are negatively related to future stock returns. Therefore, they reinterpret Fairfield et al.'s (2003) results as being consistent with Sloan's (1996) persistence argument and argue that the accrual anomaly is more likely to be rooted in accrual persistence induced by transitory estimation errors or accounting distortion.[6]

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[4] For example, changes in manufacturing and trade inventory are a leading indicator of business cycle stage, as industrial production is pro-cyclical. See the websites of The National Bureau of Economic Research (NBER, http://www.nber.org/cycles.html) and The Conference Board for indicators of the business cycle (http://www.tcb-indicators.org/).

[5] The profitability measure in Fairfield et al. (2003) is equivalent to the earnings measure in Sloan (1996) because both measures are earnings scaled by assets.

[6] The prior literature widely uses the Mishkin test to examine the accrual anomaly. I caution against using this test to identify the underlying cause of the accrual anomaly. The underlying assumption of the Mishkin test, as used in the accrual literature, is that, aside from firm size, only unexpected earnings (residuals from the forecasting equation) are priced by the market (see two equations below):

$$\text{Forecasting: } Earnings_{t+1} = \gamma_0 + \gamma_1 Accruals_t + \gamma_2 CashFlows_t + v_{t+1}; \quad (1)$$

$$\text{Valuation: } SRET_{t+1} = \delta_0 + \delta_1(Earnings_{t+1} - \gamma_0 - \gamma_1^* Accruals_t - \gamma_2^* CashFlows_t) + e_{t+1}; \quad (2)$$

where *SRET* is size-adjusted returns.

(*continued on next page*)

Hypothesis Development

From the investment perspective, accruals measure fundamental investment in working capital, which is an integral part of the firm's overall business growth. Therefore, in order to support a firm's growth, investment in working capital should co-vary with other growth-related business activities, such as hiring new employees, issuing new debt and equity, and investing in fixed assets. Furthermore, if a firm's business activities are, on average, optimal, then investment in working capital should also be positively related to the outcomes of the firm's business activities, such as actual sales. From the measurement perspective, if accruals are only meant to mitigate the noise in cash flows and thus reverse very quickly, then accruals are unlikely to capture fundamental growth information. Taken together, a testable implication of accruals' investment perspective is that accruals co-vary with other growth attributes of the firm. This leads to my first hypothesis.

> **H1:** Accruals capture fundamental investment information and, therefore, co-vary with firms' other growth attributes.

The investment/growth perspective of accruals has appealing implications for the accrual anomaly because it is well established that investment/growth is negatively related to future stock returns. For example, Fama and French (1995, 1996) suggest that growth firms are less likely to be financially distressed and, therefore, are compensated with lower expected returns. Lakonishok et al. (1994) argue that investors extrapolate past strong growth information too far into the future, and as a result, stock prices tend to reverse for growth firms. Titman et al. (2004) suggest that firms with high capital expenditures tend to be overinvesting and, therefore, earn lower future stock returns than the benchmark.

It seems plausible that multiple factors, such as accrual persistence and investment, play a role in the accrual anomaly, but it is unclear which factor has a dominant effect. Investment and accrual persistence have different implications for cross-sectional variation in the anomaly based on a firm's business model, a fact that allows me to disentangle these two competing views. In particular, the investment argument suggests that accruals predict future stock returns due to the investment/growth information contained in accruals. Cross-sectionally, accruals are more likely to capture fundamental investment information if they co-vary highly with other growth attributes. Alternatively, if increases in working capital are not accompanied by other growth-related activities, then accruals are less likely to capture fundamental investment information and may simply be viewed as subjective estimates of assets and liabilities. A testable implication of this argument is that the magnitude of the accrual anomaly is stronger in industries/firms in which accruals co-vary strongly with other growth attributes.

Footnote 6, continued

This assumption does not hold if past earnings or earnings components are priced due to risk or mispricing. For example, if accruals contain growth information and, therefore, are negatively related to future stock returns (e.g., the value-growth phenomenon in the finance literature), then the true valuation model takes the following form:

$$\begin{aligned} SRET_{t+1} &= \delta_0 + \delta_1(Earnings_{t+1} - \gamma_0 - \gamma_1' Accruals_t - \gamma_2' CashFlows_t) + \delta_2 Accruals_t + e_{t+1} \\ &= \delta_0 + \delta_1(Earnings_{t+1} - \gamma_0 - \gamma_1{}^{*} Accruals_t - \gamma_2{}^{*} CashFlows_t) + e_{t+1}. \qquad (3) \end{aligned}$$

The accrual coefficient in the true valuation Equation ($-\gamma_1{}^{*}$) should be more negative than in the case when accruals were not priced (Equation (2)). Put differently, even if investors estimate accrual persistence precisely, $\gamma_1{}^{*}$ should be larger than γ_1, which is precisely what the prior literature finds.

Similarly, if accrual persistence is industry- or firm-specific, depending on a firm's specific business model, then the persistence argument suggests a stronger accrual anomaly for industries/firms with less persistent accruals. Francis and Smith (2005) find that accruals are reliably less persistent than cash flows for only about 15 percent of the firms in a firm-specific setting. The above discussion leads to the following testable hypotheses:

H2:

The investment hypothesis: In the cross-sectional setting, the magnitude of the accrual anomaly is positively related to the co-variation between accruals and other growth attributes.

The persistence hypothesis: In the cross-sectional setting, the magnitude of the accrual anomaly is negatively related to the persistence of accruals relative to cash flows.

Investment and persistence also have different implications for future earnings. If accruals capture investment and firms' investment is optimal, on average, then the level of future earnings should increase more for high-investment firms, especially in the intermediate and long term when the investment projects are materialized. A cross-sectional implication of the investment argument is that the increase in future earnings should be more pronounced when accruals are more likely to capture fundamental investments. On the other hand, the level of future earnings should decrease if earnings are not persistent due to lower quality, and the decrease should be larger when accruals are less persistent relative to cash flows. This leads to my last hypothesis:

H3:

The investment hypothesis: Future earnings increase with accruals, and the increase is more pronounced when accruals strongly co-vary with other growth attributes.

The persistence hypothesis: Future earnings decrease with accruals, and the decrease is more pronounced when accruals are less persistent relative to cash flows.

III. SAMPLE DATA AND THE CO-VARIATION BETWEEN ACCRUALS AND OTHER GROWTH ATTRIBUTES

Sample Data

The sample data come from two sources. Accruals, cash flows, and other financial data are from the Compustat Annual Industrial, Full Coverage, and Research files. Stock return data are from CRSP monthly return files for NYSE, AMEX, and NASDAQ firms. Starting with all public firms, I exclude utility ($4900<=SIC<=4999$) and financial firms ($6000<=SIC<=6999$), as these two industries are highly regulated in much of my sample period and the measure of accruals is significantly different from that in other industries. I further exclude firms with a negative book value of equity. The final sample spans a 40-year period from 1964 to 2003 and includes 118,500 firm-year observations with non-missing accruals and future stock return data.[7]

Earnings represent earnings before extraordinary items. Accruals are measured as changes in noncash working capital minus depreciation expense, where noncash working capital is equal to the change in noncash current assets minus the change in current liabilities less short-term debt and taxes payable.[8] Cash flows are computed as earnings minus total accruals. For ease of comparison across firms, earnings and earnings components are scaled by average total assets. To examine the co-variation between accruals and other growth attributes, I consider the following growth variables: market-to-book, growth in cash sales, growth in total assets, growth in the number of employees, external financing, capital expenditures, and analyst consensus forecast of the long-term earnings growth (see Table 1 for detailed variable definition). External financing and capital expenditures measure corporate growth from financing and investing activities, respectively, as opposed to operating activities for accruals. Growth in the number of employees is particularly appealing because it is a non-accounting-based variable and, therefore, is free of any measurement error inherent in the accounting system.

Table 1, Panel A provides descriptive statistics for variables of interest. To avoid the effect of outliers, I winsorize all variables at 1 percent and 99 percent with the following two exceptions:[9] Analyst forecast of the long-term earnings growth is not winsorized, since this variable is well-defined; capital expenditures are winsorized at 99 percent because they are bounded at zero. As shown in Table 1, accruals tend to be negative, largely because of depreciation expense, with a mean of −0.023 and a median of −0.030. Market value ranges from $1.12 million to $14.35 billion. Cash sales growth has a mean of 21.1 percent and a median of 10.8 percent. The mean (median) firm shows a 12.1 percent (3.8 percent) increase in the number of employees. The median firm raises debt and equity (*XFIN*) equal to 1.4 percent of total assets. Future stock returns, defined as buy-and-hold annual returns beginning from the fifth month after a firm's fiscal year-end, have a mean of 13.6 percent and a median of 3.5 percent.

Panel B of Table 1 shows the correlation matrix, which exhibits two striking patterns. First, future stock returns are negatively related to each growth variable, suggesting that growth is negatively related to future stock returns, regardless of which growth attribute is concerned. Second, accruals and other growth variables are all positively related to each other. For instance, the Spearman correlation coefficients show that accruals have correlations of 0.305 with growth in the number of employees, 0.207 with cash sales growth, and 0.322 with external financing, which are all highly significant at the 0.01 percent level. These results provide preliminary evidence supporting the idea that accruals are simply one aspect of corporate growth.

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[7] Kraft et al. (2004) discuss three research design issues related to accrual studies: the restriction of sample to NYSE and AMEX firms, the requirement of year $t+1$ financial data, and the effect of outliers. These issues are less of a problem here, as I do not require financial data in year $t+1$ in testing the accrual anomaly and my sample includes all NYSE, AMEX, and NASDAQ firms. The concern of outliers is mitigated, as I winsorize stock returns at 1 percent and 99 percent in the regression analysis.

[8] I use the accrual measure based on the balance sheet approach in order to be comparable with the prior literature and to ensure consistency with other growth measures, such as growth in the number of employees. As a robustness check, I repeat the main analysis using the accrual measure based on the cash flow statement in the post-1988 period, and the tenor of the paper is unchanged (see Section V).

[9] In subsequent empirical analyses, I winsorize stock returns at 1 percent and 99 percent in the regression analysis to avoid the effect of outliers. In portfolio analysis, I follow the finance literature and use unwinsorized returns.

TABLE 1
Descriptive Statistics

Panel A: Descriptive Statistics

	n	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
RET	118500	0.136	0.623	−0.851	−0.252	0.035	0.373	2.885
MV	118500	570.88	1879.96	1.12	14.45	55.13	253.95	14351.9
MB	118500	2.779	3.675	0.255	0.938	1.648	3.019	25.276
ACC	118500	−0.023	0.111	−0.356	−0.079	−0.030	0.027	0.360
CSGR	109516	0.211	0.557	−0.718	−0.005	0.108	0.259	3.834
TAGR	118496	0.288	0.804	−0.461	−0.008	0.096	0.262	5.711
EMPGR	109525	0.121	0.390	−0.564	−0.045	0.038	0.174	2.382
XFIN	117577	0.118	0.328	−0.300	−0.036	0.014	0.131	1.788
CAPEXP	116750	0.441	0.655	−1.019	0.139	0.245	0.455	4.591
ANAGR	47068	19.92	12.85	−99.8	12	16.5	25	327

Panel B: Correlation Matrix (Pearson correlations are shown above the diagonal and Spearman correlations are shown below)

	RET	*MV*	*MB*	*ACC*	*CSGR*	*TAGR*	*EMPGR*	*XFIN*	*CAPEXP*	*ANAGR*
RET	1	−0.019	−0.113	−0.047	−0.060	−0.096	−0.072	−0.122	−0.074	−0.047
MV	0.001*	1	0.145	−0.052	−0.006*	0.005*	−0.002*	−0.046	−0.030	−0.112
MB	−0.174	0.406	1	0.007	0.185	0.200	0.178	0.324	0.217	0.317
ACC	−0.044	−0.016	0.076	1	0.118	0.225	0.260	0.211	0.166	0.104
CSGR	−0.049	0.116	0.250	0.207	1	0.401	0.419	0.361	0.336	0.387
TAGR	−0.084	0.186	0.314	0.388	0.489	1	0.533	0.807	0.534	0.402
EMPGR	−0.074	0.141	0.304	0.305	0.494	0.583	1	0.456	0.427	0.320
XFIN	−0.171	0.004*	0.267	0.322	0.297	0.649	0.401	1	0.497	0.481
CAPEXP	−0.090	0.107	0.312	0.207	0.370	0.510	0.428	0.436	1	0.430
ANAGR	−0.118	−0.193	0.393	0.176	0.421	0.386	0.398	0.436	0.493	1

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* Insignificant at the 5 percent level. All others are significant at the 0.01 percent.

The sample includes all U.S. firms except for utilities (4900<=SIC<=4999) and financial firms (6000<=SIC<=6999) and firms with negative book value of equity. There are 118,500 firm-year observations with non-missing accruals and future return data from 1964 to 2003. All variables are winsorized at 1 percent and 99 percent with two exceptions: *ANAGR* is unwinsorized and *CAPEXP* is winsorized at 99 percent.

Variable Definitions:

RET = raw buy-and-hold annual returns beginning from the fifth month after a firm's fiscal year-end;
MV = market value at fiscal year-end (data199*data25);
MB = market-to-book ratio measured as market value divided by the book value of equity (data60);
ACC = total accruals measured as $(\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - DEPEXP$ scaled by average total assets, where ΔCA = change in current assets (data4), $\Delta Cash$ = change in cash and cash equivalents (data1), ΔCL = change in current liabilities (data5), ΔSTD = change in short-term debt (data34), and ΔTP = change in tax payable (data71), and *DEPEXP* = depreciation and amortization expense (data14);
CSGR = cash sales growth measured as $[(S_t - \Delta AR_t) - (S_{t-1} - \Delta AR_{t-1})]/(S_{t-1} - \Delta AR_{t-1})$, where *S* is net sales (data12) and ΔAR = change in accounts receivable (data2);
TAGR = growth in total assets measured as $(TA_t - TA_{t-1})/TA_{t-1}$, where *TA* is total assets (data6);
EMPGR = growth in the number of employees measured as $(EMP_t - EMP_{t-1})/EMP_{t-1}$, where *EMP* is the number of employees (data29);
XFIN = external financing measured as changes in equity and debt minus net income, Δdata60 (common equity) + Δdata130 (prefer stock) + Δdata9 (long-term debt) + Δdata34 (short-term debt) − data172 (net income), scaled by average total assets;
CAPEXP = capital expenditures measured as capital expenditures (data128) scaled by net property, plant, and equipment; and
ANAGR = consensus analyst forecast of long-term earnings growth.

The Co-Variation between Accruals and Other Growth Attributes

To examine the investment information contained in accruals (growth reflected in the operating activities), I consider the following four growth attributes in detail: growth in the number of employees (nonaccounting variable), capital expenditures (growth reflected in the investing activities), external financing (growth reflected in the financing activities), and cash sales growth (outcome of a firm's business activities). If accruals capture fundamental investment information, then they should co-vary with these growth variables.

Panel A of Table 2 presents results based on univariate regressions. To control for cross-sectional correlations, all regressions in this panel and thereafter are based on the Fama-MacBeth approach. As expected, accruals co-vary positively with other growth attributes. In each case, the t-statistic of the variable of interest is greater than 8.0. For example, Model (1) shows that accruals are strongly positively related to growth in the number of employees, with a t-statistic of 22.73. Positive co-variation between accruals and other growth attributes supports H1.

TABLE 2
Co-Variation between Accruals and Other Growth Attributes

Panel A: Univariate Regressions of Accruals on Growth Variables

	Intercept	$EMPGR_t$	$XFIN_t$	$CAPEXP_t$	$CSGR_t$	Adj. R^2
Model 1	−0.029	0.081				0.082
	(−10.15)	(22.73)				
Model 2	−0.029		0.175			0.126
	(−11.01)		(8.72)			
Model 3	−0.034			0.039		0.042
	(−12.78)			(13.09)		
Model 4	−0.028				0.033	0.027
	(−9.70)				(9.37)	

Panel B: Regressions of Accruals on Lead, Current, and Lag Growth (X) Variables

	Intercept	X_{t-1}	X_t	X_{t+1}	Adj. R^2
Model 1	−0.034	0.028	0.082	0.007	0.095
(X = *EMPGR*)	(−12.43)	(9.50)	(22.89)	(3.06)	
Model 2	−0.029	−0.024	0.207	−0.013	0.132
(X = *XFIN*)	(−11.16)	(−4.68)	(10.19)	(−3.10)	
Model 3	−0.043	0.008	0.037	0.016	0.046
(X = *CAPEXP*)	(−16.22)	(4.75)	(12.04)	(9.67)	
Model 4	−0.039	0.017	0.029	0.047	0.066
(X = *CSGR*)	(−14.65)	(7.87)	(9.03)	(15.06)	

The dependent variable is accruals scaled by average total assets (*ACC*). *EMPGR* is growth in the number of employees. *XFIN* is external financing measured as changes in equity and debt minus net income scaled by average total assets. *CAPEXP* is capital expenditures scaled by average total assets. *CSGR* is cash sales growth. See Table 1 for detailed definition.
The sample period is from 1964 to 2003.
t-statistics in parentheses are Fama-MacBeth t-statistics.
All variables are winsorized at 1 percent and 99 percent except that *CAPEXP* is winsorized at 99 percent.

The univariate regressions of accruals on other contemporaneous growth variables in Panel A of Table 2 provide an incomplete picture of how these growth attributes are related to each other because they do not take into account the lead-lag relation among these variables. For instance, a manufacturing firm needs to produce products before it can sell them. It is also very common for a retailer to build up inventory if it anticipates higher demand in the future. Therefore, it seems reasonable that sales growth lags growth in working capital (accruals). To address the lead-lag relation, I regress accruals on lead, current, and lag growth variables. In particular, I consider the following four models:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + \varepsilon_t; \tag{4}$$

$$ACC_t = \beta_0 + \beta_1 XFIN_{t-1} + \beta_2 XFIN_t + \beta_3 XFIN_{t+1} + \varepsilon_t; \tag{5}$$

$$ACC_t = \gamma_0 + \gamma_1 CAPEXP_{t-1} + \gamma_2 CAPEXP_t + \gamma_3 CAPEXP_{t+1} + \varepsilon_t; \tag{6}$$

$$ACC_t = \theta_0 + \theta_1 CSGR_{t-1} + \theta_2 CSGR_t + \theta_3 CSGR_{t+1} + \varepsilon_t; \tag{7}$$

where:

ACC = the dependent variable is accruals;
EMPGR = growth in the number of employees;
XFIN = external financing;
CAPEXP = capital expenditures; and
CSGR = cash sales growth.

Panel B of Table 2 reports the regression results. Model (1) shows that accruals are not only strongly positively related to current employee growth (coeff = 0.082, t = 22.89), but are also significantly related to both lead (coeff = 0.028, t = 9.50) and lag employee growth (coeff = 0.007, t = 3.06).[10] Model (2) suggests that accruals are positively related to the current external financing variable and negatively related to both lead and lag variables, but clearly current external financing dominates (coeff = 0.207, t = 10.19).[11] Model (3) shows that accruals are positively related to three capital expenditure variables, confirming the idea that investment in working capital and investment in fixed assets often go hand-in-hand. Model (4) suggests a significantly positive coefficient of current sales growth (t = 9.03). After controlling for current sales growth, both lead and lag cash sales growth have strong positive coefficients, with t-statistics of 7.87 to 15.06, respectively, suggesting that accruals contain much more growth information than that captured by current sales growth. Among the three cash sales growth variables, lag cash sales growth has the largest coefficient. Given that growth in the number of employees is not an outcome of the financial reporting system and, thus, is relatively free of measurement errors associated with persistence or earnings quality, I focus on this variable to test the investment hypothesis of the accrual anomaly.[12]

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[10] Accruals could be mechanically related to the number of employees if salary payable increases with the number of employees. But this mechanical relation suggests a negative correlation between accruals and employee growth, as opposed to a positive relation that I predict in the paper.

[11] The negative coefficients on both lead and lag variables are somewhat surprising. Unreported analysis suggests that this might be due to the multicollinearity among three external financing variables. The lead, current, and lag external financing variables are highly positively correlated with each other, and the correlations are higher than those of employee growth, capital expenditures, or cash sales growth. In univariate regressions in which the lead, current, and lag external financing variables act as the independent variable separately, the coefficient of the external financing variable is highly positive in each case.

IV. EMPIRICAL EVIDENCE

This section tests the investment and persistence hypotheses for the accrual anomaly based on their different implications for the cross-sectional variation of the anomaly. I first estimate industry-specific measures of the co-variation between accruals and growth in the number of employees (*COVAR*) and the relative persistence of accruals to cash flows (*PERS*).[13] Then I examine cross-sectional variation in the accrual anomaly based on *COVAR* and *PERS* using the regression and the portfolio approaches. Finally I examine the earnings evidence.

The Industry-Specific *COVAR* and *PERS* Measures

The investment information contained in accruals varies across industries depending on a firm's production function. *Ex ante*, I expect accruals to co-vary strongly with other growth attributes in some industries, such as manufacturing and retail. In these industries, a firm's inventory and accounts receivable are very sensitive to the business cycle and are good indicators of the firm's growth stage. In other industries, accruals may not be a good indicator of investment or growth. For example, for mining or agriculture companies, inventories are more likely to develop as a result of luck than an indicator of a firm's business stage. Similarly, growth in consulting and service companies is unlikely to be reflected in changes in working capital.

I use the co-variation between accruals and growth in the number of employees to quantify the investment information contained in accruals. Specifically, for each industry in year t, I run Equation (4) based on observations in the most recent two years (years $t-2$ and $t-1$). I skip year t because $EMPGR_{t+1}$ is not available when examining the accrual anomaly in year t, and use two years' data to ensure a sufficient number of observations in each industry.[14] *COVAR* is $\alpha_1 + \alpha_2 + \alpha_3$ from Equation (4). A higher value of *COVAR* suggests that accruals co-vary strongly with other growth attributes.

Table 3, Panel A provides descriptive statistics of the parameter estimates of Equation (4). The mean coefficients of lead, current, and lag *EMPGR* are all positive, suggesting that the positive relation between accruals and *EMPGR* documented in Table 2, Panel B also applies to the industry-specific regressions (the magnitude of coefficients is similar too).

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[12] I acknowledge that the number of employees is a proxy that contains measurement errors as well, since I do not distinguish between high- and low-skill workers, between executives and blue-collar workers, etc. Industry- and time-specific measurement errors are mitigated, as I use industry-year measures of the co-variation between accruals and growth in the number of employees.

[13] An alternative approach is to test firm-specific *COVAR* and *PERS* measures. In unreported analysis, I estimate firm-specific *COVAR* and *PERS* using time-series regression based on the data from the most recent 15 years (with a minimum of ten years). The findings are qualitatively similar, although the results are albeit weaker. The main problem of using firm-specific *COVAR* and *PERS* is that time-series regressions require ten years' data and thus introduce a serious survivorship bias (young firms are excluded from the sample). To the extent that younger firms are more likely to be growth firms, this time-series approach excludes many growth firms from the sample and thus reduces variation in accruals.

[14] Results are robust when I use three years' or one year's data to estimate *COVAR* and *PERS*.

TABLE 3
Descriptive Statistics of the Growth and Persistence Models

	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Panel A: The Growth Model: $ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$							
α_0	−0.039	0.031	−0.186	−0.058	−0.038	−0.019	0.118
α_1	0.035	0.092	−0.839	−0.002	0.028	0.069	0.532
α_2	0.092	0.109	−0.574	0.025	0.085	0.151	0.894
α_3	0.011	0.096	−0.835	−0.025	0.009	0.046	0.954
Adj. R^2	0.151	0.186	−0.423	0.023	0.130	0.245	0.912
COVAR ($\alpha_1 + \alpha_2 + \alpha_3$)	0.138	0.171	−1.152	0.046	0.129	0.219	1.194
Panel B: The Persistence Model: $E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$							
β_0	0.001	0.026	−0.178	−0.010	0.004	0.017	0.128
β_1	0.620	0.306	−1.084	0.461	0.625	0.787	2.587
β_2	0.705	0.257	−0.419	0.565	0.720	0.850	2.179
Adj. R^2	0.477	0.225	−0.156	0.336	0.481	0.641	0.995
PERS ($\beta_1 - \beta_2$)	−0.086	0.213	−1.554	−0.168	−0.079	0.008	1.356

Each year, I calculate the co-variation between accruals and growth (*COVAR*) and the accrual persistence relative to cash flows (*PERS*) for each two-digit SIC industry based on the most recent two years' data (a minimum of ten observations). Specifically, I run the following two regressions:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$$
$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$$

where *ACC* = accruals; *EMPGR* = growth in the number of employees; *E* = income before extraordinary items scaled by average total assets; and *CF* = cash flows measured as earnings minus accruals. See Table 1 for detailed definition.

COVAR is $\alpha_1 + \alpha_2 + \alpha_3$ from the first regression based on all available observations from years $t-2$ to $t-1$, and *PERS* is $\beta_1 - \beta_2$ from the second regression based on all available observations from years $t-1$ to t. Panels A and B reports descriptive evidence on parameter estimates for the above two regressions, respectively. The sample period is from 1964 to 2003. All variables are winsorized at 1 percent and 99 percent.

The *COVAR* measure ranges from −1.152 to 1.194, suggesting substantial cross-sectional variation in the information content of accruals.[15]

Detailed analysis (untabulated) shows that, as expected, *COVAR* varies across industries depending on the firm's production function. In general, retailers, wholesalers, and manufacturers are more likely to fall into the top *COVAR* quartile. The top five industries (two-digit SIC code in parentheses) are Tobacco Products (21), Leather and Leather Products (31), Apparel and Other Finished Products (23), Home Furniture and Equipment Store (57),

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[15] The information content of accruals depends on the firm's business models and, therefore, the *COVAR* measure should be persistent over time. In untabulated analysis, I regress $COVAR_t$ on its lagged values using the following model:

$$COVAR_t = \alpha_0 + \alpha_1 COVAR_{t-1}(COVAR_{t-2}, COVAR_{t-3}, COVAR_{t-4}) + e_t.$$

Consistent with my prediction, the coefficient estimate on $COVAR_{t-1}$ is positive and highly significant (α_1 = 0.539, t = 14.21). The coefficient estimate remains highly significant when I consider the second (α_1 = 0.273, t = 8.23), third (α_1 = 0.246, t = 7.25) or fourth lag of *COVAR* (α_1 = 0.215, t = 6.20) in the model.

and Building Materials, Hardware, and Garden—Retailer (52). On the other extreme, service, mining, and agriculture production industries tend to fall into the bottom *COVAR* quartile. The bottom five industries are Miscellaneous Repair Services (76), Amusements and Recreation (79), Social Services (83), Metal Mining (10), and Educational Services (82). Taken as a whole, the mean *COVAR* is 0.20 and 0.14 for manufacturing and retail/wholesale industries, respectively, as opposed to 0.09 and 0.06 for service and agriculture /mining industries, respectively, suggesting some fundamental difference in the information content of accruals across industries. The variations in accruals and growth in the number of employees are comparable for most industries in the sense that both variables have similar standard deviations, negative values in the 25th percentile, and positive values in the 75th percentile.

To estimate industry-specific accrual persistence relative to cash flows, I follow Sloan (1996) and run the following regression for each two-digit SIC industry based on the data from two most recent years (years $t-1$ and t):

$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t. \tag{8}$$

Following the accrual literature, β_1 and β_2 measure the persistence of accruals and cash flows, respectively. Therefore, $\beta_1 - \beta_2$ measures the relative persistence of accruals to cash flows (*PERS*). A negative value of *PERS* implies that accruals are less persistent than cash flows, and a positive value of *PERS* suggests that accruals are more persistent than cash flows.

Table 3, Panel B provides descriptive statistics of the parameters of Equation (8) and the *PERS* measure. Consistent with the prior literature, accruals are less persistent than cash flows, on average, with a mean *PERS* of −0.086 and a median of −0.079. However, there is considerable variation in the *PERS* measure, which ranges from −1.554 to 1.356. Since this paper examines cross-sectional variation in the accrual anomaly based on *COVAR* or *PERS*, it is interesting to see whether *COVAR* and *PERS* are correlated. Untabulated results show that the Pearson correlation between *COVAR* and *PERS* is 0.010, with a p-value of 0.674, suggesting that these two measures are largely orthogonal.

Cross-Sectional Variation in the Accrual Anomaly—The Regression Approach

The investment hypothesis suggests that the predictive power of accruals for future stock returns is positively related to the degree to which accruals capture fundamental investment information. As a result, the magnitude of the accrual anomaly should be positively related to *COVAR*. To test this hypothesis, I estimate the following regression:

$$RET_{t+1} = \alpha_0 + \alpha_1 ACC_t + \alpha_2 COVAR_t + \alpha_3 COVAR{*}ACC_t + \varepsilon_t \tag{9}$$

where *RET* is annual returns. The coefficient of *ACC* is expected to be significantly negative, if the accrual anomaly exists in my sample. The main variable of interest is *COVAR*ACC*. The investment hypothesis predicts a negative coefficient on this interaction term, suggesting that the accrual anomaly is stronger for high-*COVAR* firms.

Similarly, the persistence hypothesis suggests that the accrual anomaly should be stronger when accruals are less persistent. Therefore, it predicts a positive coefficient on the interaction term (*PERS*ACC*) in the following model:

$$RET_{t+1} = \alpha_0 + \alpha_1 ACC_t + \alpha_2 PERS_t + \alpha_3 PERS{*}ACC_t + \varepsilon_t. \quad (10)$$

Table 4 reports evidence on the investment and persistence hypotheses. Model (1) replicates the accrual anomaly. Consistent with the prior literature, I find a significant negative coefficient on accruals, suggesting that high-accrual firms earn lower future stock returns. Model (2) tests the investment hypothesis. I find that the coefficient of *COVAR*ACC* is negative and highly significant (coeff = −0.204, t = −2.49), an outcome supporting the investment hypothesis and suggesting that the accrual anomaly is stronger when accruals co-vary with other growth attributes. In contrast to the prediction of the persistence hypothesis, I find a negative but insignificant coefficient of *PERS*ACC* in Model (3). A negative coefficient suggests that the accrual anomaly is stronger when accruals are more persistent than cash flows, a result that goes against the persistence argument. In Model (4), I include *COVAR* and *PERS* as well as their interactions with accruals. The coefficient of *COVAR*ACC* remains highly negative while that of *PERS*ACC* is still insignificant.

TABLE 4
Cross-Sectional Variation in the Accrual Anomaly—The Regression Approach

	1	2	3	4
Intercept	0.138	0.122	0.145	0.135
	(4.08)	(3.59)	(3.85)	(3.55)
ACC	−0.293	−0.204	−0.265	−0.160
	(−6.38)	(−3.42)	(−3.33)	(−1.70)
COVAR		0.014		0.016
		(0.96)		(1.03)
*COVAR*ACC*		−0.204		−0.207
		(−2.49)		(−2.88)
PERS			−0.025	−0.027
			(−1.19)	(−1.20)
*PERS*ACC*			−0.071	−0.086
			(−0.63)	(−0.75)
Adj. R^2	0.006	0.009	0.011	0.013

The dependent variable is annual stock returns beginning from the fifth month after a firm's fiscal year-end. Each year, I calculate the co-variation between accruals and growth (*COVAR*) and the accrual persistence relative to cash flows (*PERS*) for each two-digit SIC industry based on the most recent two years' data (a minimum of ten observations) using the following two models:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$$

$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$$

where *ACC* = accruals; *EMPGR* = growth in the number of employees; *E* = income before extraordinary items scaled by average total assets; and *CF* = cash flows measured as earnings minus accruals. See Table 1 for detailed definition.

COVAR is $\alpha_1 + \alpha_2 + \alpha_3$ from the first regression, and *PERS* is $\beta_1 - \beta_2$ from the second regression. Both *COVAR* and *PERS* are transformed into percentile rankings and converted to a [0,1] scale, where rankings are obtained by annually ranking observations and assigning them in equal numbers to 100 portfolios. All other variables are winsorized at 1 percent and 99 percent.

The sample period is from 1964 to 2003.

t-statistics in parentheses are Fama-MacBeth t-statistics.

Overall, I find that *COVAR* explains cross-sectional variation in the accrual anomaly, supporting the investment hypothesis. On the other hand, the *PERS* results are inconsistent with the persistence hypothesis.

Cross-Sectional Variation in the Accrual Anomaly—The Portfolio Approach

Compared to the regression approach, the portfolio approach offers a number of advantages. First, it allows for nonlinearity in variables of interest and, therefore, offers a clearer picture of the relationship between returns and variables of interest. Second, it mitigates the effect of outliers by averaging stock returns, as oppose to minimizing squared errors in the regression analysis. Finally, this approach facilitates gauging the economic significance.

To test the effect of *COVAR* on the accrual anomaly, I sort firms into four equal-size *COVAR* groups each year. For each *COVAR* group, I rank stocks into five *ACC* quintiles. The returns of the Q1–Q5 hedge portfolio, which has a long position in the bottom *ACC* quintile stocks and a short position in the top *ACC* quintile stocks, measure the magnitude of the accrual anomaly in each *COVAR* group. The investment hypothesis predicts a stronger accrual anomaly in the high-*COVAR* group.

Table 5, Panel A replicates the accrual anomaly. Accruals are negatively related to future stock returns. The raw and size-adjusted returns for the Q1–Q5 hedge portfolio are 9.76 percent and 8.28 percent, with t-statistics of 6.09 and 5.48, respectively. Panel B reports raw and size-adjusted returns as well as accruals for five *ACC* quintiles and the Q1–Q5 hedge portfolio across four *COVAR* groups. Consistent with the investment hypothesis, I find that the magnitude of the accrual anomaly monotonically increases with *COVAR*. When accruals co-vary strongly with employee growth in the top *COVAR* group, they have strong predictive power for future stock returns. The Q1–Q5 hedge portfolio achieves raw and size-adjusted returns of 13.68 percent ($t = 7.80$) and 11.78 percent ($t = 7.19$), respectively. When accruals show little correlation with growth in the number of employees in the bottom *COVAR* group, the accrual anomaly is rather weak. The raw and size-adjusted returns of the Q1–Q5 hedge portfolio are 7.06 percent ($t = 2.77$) and 6.03 percent ($t = 2.69$), respectively. The difference in the magnitude of the accrual anomaly, as measured by the return to the Q1–Q5 hedge portfolio, between the top and the bottom *COVAR* groups is significantly positive ($\Delta RET_{t+1} = 6.62$ percent, $t = 2.58$; $\Delta SRET_{t+1} = 5.75$, percent $t = 2.37$). While the magnitude of the accrual anomaly increases monotonically from the bottom to the top *COVAR* group, the level of accruals is similar across four *COVAR* groups. The accrual difference between *ACC1* and *ACC5* is more than −25 percent of total assets in each *COVAR* group, suggesting that the return difference across four *COVAR* groups is unlikely to be explained by the magnitude of accruals.[16] This evidence provides strong support to the investment hypothesis that the accrual anomaly is attributable to the fundamental investment information contained in accruals.

To test the persistence hypothesis, I partition the sample into three groups based on the persistence of accruals and cash flows. The first *PERS* group consists of observations for which accruals are significantly less persistent than cash flows. In the second *PERS* group,

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[16] As I scale accruals by average total assets, one concern about the magnitude of accruals is that the level of assets differs across four *COVAR* groups. For example, service firms (e.g., consulting firms) are likely to have low balance sheet assets. To address this issue, I also compare accruals scaled by sales across *COVAR* groups. Unreported results show that, for the low accrual quintile (Q1), accruals increase from the bottom to the top *COVAR* groups, and for the high accrual quintile (Q5), accruals are similar across four *COVAR* groups. As a result, the accrual differential between Q1 and Q5 tends to be more negative for the bottom *COVAR* group, which again cannot explain the return difference across *COVAR* groups.

TABLE 5
Cross-Sectional Variation in the Accrual Anomaly—The Portfolio Approach

	Accrual Quintiles					
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q1–Q5**
Panel A: The Accrual Anomaly for the Whole Sample						
RET_{t+1}	19.79%	17.77%	16.81%	14.79%	10.03%	9.76% (6.09)
$SRET_{t+1}$	2.39%	2.35%	1.78%	−0.42%	−5.89%	8.28% (5.48)
ACC_t	−15.21%	−6.35%	−2.59%	1.62%	13.00%	−28.21% (−41.45)
Panel B: The Accrual Anomaly across Four *COVAR* Quartiles						
The accrual anomaly in the bottom *COVAR* group:						
RET_{t+1}	16.89%	15.91%	15.03%	14.20%	9.83%	7.06% (2.77)
$SRET_{t+1}$	0.16%	0.47%	0.43%	−0.69%	−5.87%	6.03% (2.69)
ACC_t	−16.51%	−7.92%	−4.47%	−0.90%	9.03%	−25.54% (−40.21)
The accrual anomaly in the second *COVAR* group:						
RET_{t+1}	19.70%	18.68%	17.83%	13.50%	10.45%	9.25% (4.10)
$SRET_{t+1}$	3.08%	3.91%	3.37%	−0.72%	−4.93%	8.01% (3.61)
ACC_t	−15.61%	−6.42%	−2.60%	1.49%	12.56%	−28.16% (−38.19)
The accrual anomaly in the third *COVAR* group:						
RET_{t+1}	19.81%	16.27%	16.89%	14.24%	9.34%	10.47% (3.89)
$SRET_{t+1}$	2.82%	1.13%	2.30%	−0.13%	−6.00%	8.82% (3.44)
ACC_t	−14.43%	−5.52%	−1.55%	2.93%	14.67%	−29.10% (−39.87)
The accrual anomaly in the top *COVAR* group:						
RET_{t+1}	20.51%	17.50%	15.51%	12.64%	6.84%	13.68% (7.80)
$SRET_{t+1}$	3.08%	2.64%	0.61%	−2.55%	−8.69%	11.78% (7.19)
ACC_t	−14.45%	−5.43%	−1.53%	3.13%	15.03%	−29.48% (−39.48)

The difference in the magnitude of the accrual anomaly between the top and the bottom *COVAR* groups: ΔRET_{t+1} = 6.62% (t = 2.58), $\Delta SRET_{t+1}$ = 5.75% (t = 2.37).

(*continued on next page*)

TABLE 5 (continued)

	Accrual Quintiles					
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q1–Q5**
Panel C: The Accrual Anomaly across Three PERS Groups						
Accruals are significantly less persistent than cash flows ($\beta_1 < \beta_2$):						
RET_{t+1}	19.78%	19.35%	15.35%	14.91%	10.83%	8.95%
						(3.57)
$SRET_{t+1}$	3.53%	4.85%	0.94%	0.06%	−4.54%	8.07%
						(3.57)
ACC_t	−15.14%	−6.06%	−2.23%	2.05%	13.20%	−28.34%
						(−35.23)
No significant difference between accrual and cash flow persistence ($\beta_1 = \beta_2$):						
RET_{t+1}	17.95%	16.60%	15.85%	13.51%	8.00%	9.95%
						(4.98)
$SRET_{t+1}$	0.84%	1.36%	0.90%	−1.39%	−7.59%	8.44%
						(4.65)
ACC_t	−15.23%	−6.63%	−2.98%	1.15%	12.66%	−27.89%
						(−44.70)
Accruals are significantly more persistent than cash flows ($\beta_1 > \beta_2$):						
RET_{t+1}	20.37%	21.85%	22.54%	15.28%	12.92%	7.45%
						(1.67)
$SRET_{t+1}$	1.61%	5.46%	6.86%	−1.16%	−4.00%	5.61%
						(1.31)
ACC_t	−16.28%	−7.25%	−3.42%	0.87%	10.67%	−26.95%
						(−15.23)

The difference in the magnitude of the accrual anomaly between the first and the third PERS groups: $\Delta RET_{t+1} = 1.50\%$ (t = 0.37), $\Delta SRET_{t+1} = 2.46\%$ (t = 0.53)

Each year, I calculate the co-variation between accruals and growth (*COVAR*) and the accrual persistence relative to cash flows (*PERS*) for each two-digit SIC industry based on the most recent two years' data (a minimum of ten observations) using the following two models:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$$

$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$$

where *ACC* = accruals; *EMPGR* = growth in the number of employees; *E* = income before extraordinary items scaled by average total assets; and *CF* = cash flows measured as earnings minus accruals. See Table 1 for detailed definition.

COVAR is $\alpha_1 + \alpha_2 + \alpha_3$ from the first regression, and *PERS* is $\beta_1 - \beta_2$ from the second regression.

Panel A examines the accrual anomaly in the whole sample by sorting stocks into five accrual quintiles.

In Panel B, I sort firms into four equal-size *COVAR* groups.

In Panel C, I sort firms into three *PERS* groups based on whether accruals are significantly less persistent than, as persistent as, or significantly more persistent than cash flows. For each resulting group, I examine the accrual anomaly by sorting stocks into five accrual quintiles. *RET* (*SRET*) is equal-weighted raw (size-adjusted) annual return beginning from the fifth month after a firm's fiscal year-end.

The sample period is from 1964 to 2003.

t-statistics in parentheses are Fama-MacBeth t-statistics.

the difference in the accrual and cash flow persistence is insignificant. Finally, the third *PERS* group consists of observations in which accruals are significantly more persistent than cash flows. There are 56,517, 57,293, and 3,088 observations in the first, second, and third *PERS* groups, respectively.[17] If I can measure accruals and cash flow persistence precisely, then the persistence hypothesis predicts a strong accrual anomaly in the first *PERS* group, an insignificant accrual anomaly in the second *PERS* group, and an opposite accrual anomaly in the third *PERS* group. At a minimum, the accrual anomaly should be stronger in the first *PERS* group than in the second or the third *PERS* group in order to support the persistence hypothesis.

Table 5, Panel C reports raw and size-adjusted returns as well as accruals for the three *PERS* groups. I find that high-accrual firms have lower future returns in each *PERS* group. Both raw and size-adjusted returns to the Q1–Q5 hedge portfolio are significant in the first and the second *PERS* groups and are marginally significant in the third *PERS* group. In terms of magnitude, the second *PERS* group has a stronger accrual anomaly than the first, although the difference is insignificant. The magnitude of the accrual anomaly in the first *PERS* group is not significantly different from that in the third *PERS* group either (ΔRET_{t+1} = 1.50 percent, t = 0.37, $\Delta SRET_{t+1}$ = 2.46 percent, t = 0.53). These results do not support the persistence hypothesis.

As the final portfolio analysis, I sort stocks independently by *COVAR* and *PERS*, with four groups in each dimension. For each resulting portfolio, I measure the magnitude of the accrual anomaly as the return difference between the bottom and top accrual quartiles. To ensure diversification of idiosyncratic risk, I require each accrual quartile to have at least ten stocks.[18] The results are reported in Table 6. Consistent with the investment argument, the magnitude of the accrual anomaly increases when I move from low- to high-*COVAR* quartiles. When *COVAR* is in the bottom quartile, none of the four *PERS* portfolios has a significant accrual anomaly. When *COVAR* is in the top quartile, the accrual anomaly is significant in each *PERS* portfolio. On the other hand, I do not observe a decreasing pattern of the magnitude of the accrual anomaly from low- to high-*PERS* portfolios. In fact, the magnitude increases from low- to high-*PERS* portfolios except for the top *PERS* quartile, a result consistent with that from the regression analysis (a negative coefficient of *PERS*ACC* in Table 4). If anything, such evidence goes against the persistence argument.

Empirical Tests on Future Earnings

Persistence and investment may have different implications for future earnings.[19] If accruals capture persistence and earnings quality, then future earnings should fall for high-accrual firms. If accruals capture fundamental investment information, then future earnings should increase for high-accrual firms if investment is optimal, on average. As the accounting system recognizes earnings gradually over time, the effect of investment on future earnings is likely to spread over a number of years, depending on a firm's investment cycle.

One compounding issue in testing the investment/growth hypothesis is that near-term earnings growth could be unusual in nature for high- and low-growth firms due to at least

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[17] One caveat to this approach is that the third group has considerably fewer observations than the first or second group. The readers may exercise caution in interpreting the results for the third group. In a robustness check, I partition the sample into four equal-size groups similar to Panel B. The accrual anomaly is highly significant in each group, and in terms of the magnitude, the bottom residual *PERS* group has a smaller accrual anomaly than the second or third group, a result inconsistent with the persistence argument.

[18] The three-way sort by *COVAR*, *PERS*, and accruals partitions the sample into 64 portfolios each year. As a result, the number of stocks is small in early years and the results could be affected by outliers.

[19] One caveat of the earnings evidence is that it does not directly address the accrual anomaly because I do not control for the market's expected earnings or earnings growth. Rather, I examine the information content of accruals by testing different implications of investment and persistence for future earnings. I thank an anonymous referee for suggesting these tests.

TABLE 6
The Magnitude of the Accrual Anomaly across *COVAR* and *PERS* Portfolios

	Q1 (*COVAR*)	Q2 (*COVAR*)	Q3 (*COVAR*)	Q4 (*COVAR*)
Q1 (*PERS*)	3.09%	8.78%	5.47%	5.83%
	(1.17)	(4.13)	(1.78)	(2.32)
Q2 (*PERS*)	2.58%	10.42%	10.95%	9.26%
	(0.73)	(2.94)	(3.23)	(3.16)
Q3 (*PERS*)	7.43%	13.44%	14.25%	12.13%
	(1.95)	(3.49)	(4.93)	(3.20)
Q4 (*PERS*)	1.25%	6.05%	2.51%	12.09%
	(0.49)	(1.71)	(0.77)	(6.33)

Each year, I calculate the co-variation between accruals and growth (*COVAR*) and the accrual persistence relative to cash flows (*PERS*) for each two-digit SIC industry based on the most recent two years' data (a minimum of ten observations) using the following two models:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$$

$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$$

where ACC = accruals; $EMPGR$ = growth in the number of employees; E = income before extraordinary items scaled by average total assets; and CF = cash flows measured as earnings minus accruals.

COVAR is $\alpha_1 + \alpha_2 + \alpha_3$ from the first regression, and *PERS* is $\beta_1 - \beta_2$ from the second regression.

I sort firms into four *COVAR* quartiles and independently sort firms into four *PERS* quartiles. The intersection between *COVAR* and *PERS* results in 16 portfolios. For each resulting portfolio, I measure the magnitude of the accrual anomaly as the return difference between the bottom and top accrual quartiles, where accrual quartiles with fewer than ten stocks are eliminated.

The sample period is from 1964 to 2003.

t-statistics in parentheses are Fama-MacBeth t-statistics.

two reasons. First, high (low) growth in fundamentals, such as the number of employees and working capital investment, is often accompanied with high (low) growth in earnings, which tends to reverse in the next period. For instance, low-growth firms often suffer setbacks in sales and are often temporarily distressed. During such bad times, firms not only have bad economic performance, but also are more likely to take big accounting charges, the real effect of which could spread over a number of years. Second, it is recognized in the literature that accounting conservatism often lead to lower earnings in year $t+1$ for high-investment/growth firms, as firms recognize expenses immediately but the new investment has not generated much revenue yet (e.g., Fairfield et al. 2003; Harris and Nissim 2006).

As a first pass, I examine how the traditional one-year-ahead earnings growth varies with accruals and standard growth variables. One-year-ahead earnings growth is defined as $\frac{E_{t+1} - E_t}{TA_t}$, where E is income before extraordinary items, and TA is total assets. I scale earnings growth by total assets instead of earnings for two reasons: (1) about 27.1 percent of observations in my sample have negative earnings, and the percentage gets higher in later years (28.29 percent, 34.51 percent, and 41.64 percent in 1980s, 1990s, and 2000s, respectively); and (2) low earnings introduce a small denominator problem.

The first panel of Table 7 reports the average one-year-ahead earnings growth across five quintiles based on accruals and standard growth variables. I find that high-growth/

TABLE 7
Earnings Growth across Five Growth/Accruals Quintiles

	Earnings Growth across Five Quintiles Sorted By:				
	Employee Growth	**Sales Growth**	**Total Accruals**	**Working Capital Accruals**	**Changes in Inventory**
One-year-ahead earnings growth based on actual earnings:					
Q1	2.26%	1.49%	3.04%	2.77%	2.24%
Q2	0.42%	0.46%	0.46%	0.40%	0.16%
Q3	0.30%	0.44%	0.05%	0.17%	0.32%
Q4	0.02%	0.32%	−0.24%	−0.16%	0.06%
Q5	−0.37%	0.19%	−1.09%	−0.97%	−0.50%
Q5–Q1	−2.63%	−1.30%	−4.13%	−3.73%	−2.74%
	(−4.97)	(−4.32)	(−8.77)	(−9.71)	(−9.56)
Ex ante longer-term earnings growth based on analysts' forecasts:					
Q1	15.69%	15.59%	17.99%	18.22%	16.34%
Q2	15.12%	14.64%	16.88%	16.85%	19.46%
Q3	16.89%	16.38%	17.25%	17.20%	17.99%
Q4	20.55%	19.67%	19.46%	19.24%	18.73%
Q5	26.22%	26.67%	23.54%	23.60%	23.14%
Q5–Q1	10.53%	11.08%	5.55%	5.38%	6.80%
	(14.64)	(16.15)	(6.90)	(7.55)	(15.05)
Ex post longer-term earnings growth based on actual earnings:					
Q1	0.51%	−0.97%	2.07%	1.78%	1.53%
Q2	1.49%	1.08%	2.09%	1.74%	1.69%
Q3	2.52%	2.44%	2.18%	2.25%	2.38%
Q4	3.33%	4.00%	2.42%	2.76%	2.69%
Q5	4.25%	5.70%	3.28%	3.52%	3.84%
Q5–Q1	3.74%	6.66%	1.21%	1.74%	2.31%
	(6.87)	(17.67)	(3.91)	(6.32)	(8.54)

This table reports the average earnings growth across five quintiles based on employee growth, sales growth, total accruals, working capital accruals, or changes in inventory. One-year-ahead earnings growth is defined as $(E_{t+1} - E_t)/TA_t$, where E is income before extraordinary items and TA is total assets. *Ex ante* longer-term earnings growth is proxied by analysts' forecasts of long-term earnings growth and *ex post* longer-term earnings growth is defined as $((E_{t+1} + E_{t+2} + E_{t+3})/3 - (E_{t-1} + E_{t-2} + E_{t-3})/3)/((TA_{t-1} + TA_{t-2} + TA_{t-3})/3)$.
The sample period is from 1967 to 2001.
t-statistics in parentheses are Fama-MacBeth t-statistics.

accrual firms have significantly lower earnings growth in year $t+1$ than low-growth/accrual firms, a result that does not support the simple version of the investment argument, but is consistent with the unusual near-term earnings growth discussed earlier. In order to shed further light on this issue, I examine the unusual nature of near-term earnings growth from the following two aspects and find supportive evidence. First, high-growth firms have higher earnings growth in year t than low-growth firms, and earnings growth tends to be mean reverting. Table 8, Panel A shows that the time-series patterns of unscaled earnings from

TABLE 8
Special Items and Time-Series Earnings for Low- and High-Growth Firms

Panel A: The Time-Series Pattern of Earnings for Low- and High-Growth Firms

	E_{t-3}	E_{t-2}	E_{t-1}	E_t	E_{t+1}	E_{t+2}	E_{t+3}
The bottom and top employee growth quintiles:							
Q1 (low-growth)	29.32	28.76	24.08	20.51	27.68	32.63	32.22
Q5 (high-growth)	16.45	19.79	24.36	26.78	20.43	25.19	26.65
The bottom and top sales growth quintiles:							
Q1 (low-growth)	26.59	27.33	25.63	14.11	18.24	25.73	27.03
Q5 (high-growth)	16.43	18.68	23.86	29.50	27.33	28.27	32.72
The bottom and top accrual quintiles:							
Q1 (low-growth)	33.09	34.25	32.40	26.53	40.43	45.36	46.32
Q5 (high-growth)	11.18	12.44	16.31	19.02	17.62	18.02	20.17
The bottom and top quintiles based on changes in inventory:							
Q1 (low-growth)	24.07	23.46	20.63	19.13	26.72	29.34	32.56
Q5 (high-growth)	15.68	18.38	22.76	25.56	22.78	28.00	31.89

Panel B: The Magnitude/Frequency of Special Items for Low- and High-Growth Firms

	Quintiles Sorted By:			
	Employee Growth	**Sales Growth**	**Total Accruals**	**Changes in Inventory**
Average special items scaled by lag total assets:				
Q1 (low-growth)	−0.011	−0.010	−0.013	−0.010
Q5 (high-growth)	−0.007	−0.007	−0.004	−0.004
Q5–Q1	0.004	0.003	0.009	0.006
	(3.16)	(3.87)	(5.93)	(7.58)
Percentage of firms with negative special items:				
Q1 (low-growth)	24.96%	23.08%	23.89%	23.13%
Q5 (high-growth)	14.99%	14.55%	12.57%	12.58%
Q5–Q1	9.97%	8.53%	11.32%	10.55%
	(8.37)	(8.41)	(9.01)	(10.64)

Each year, I sort firms into five quintiles based on employee growth, sales growth, total accruals, or changes in inventory. Panel A presents average earnings (unscaled income before extraordinary items, in million dollars) from years $t-3$ to $t+3$. Panel B reports average special items scaled by lagged total assets for the bottom and top quintiles.

The sample period is from 1967 to 2001 in Panel A and from 1964 to 2003 in Panel B.

years $t-3$ to $t+3$ across different partitions on accruals and standard growth variables.[20]

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[20] By using average unscaled earnings, I essentially aggregate all firms in the same accrual/growth quintile into one observation because the number of observations is the same across the five quintiles. An alternative approach is to calculate average earnings per share (*EPS*), although some firms never split their stocks and thus have large *EPS*s. I find similar time-series patterns based on *EPS* winsorized at 1 percent and 99 percent.

Earnings in the low-growth/accrual quintile (Q1) experience a big drop from year $t-1$ to year t but quickly recover in one or two years. On the other hand, earnings in the high-growth/accrual quintile (Q5) show a temporary spike in year t, which leads to a reversal in year $t+1$. Second, both the frequency and the magnitude of negative special items are higher in year t for low-growth firms than for high-growth firms (Table 8, Panel B). By definition, special items are transitory in nature and thus tend to reverse in year $t+1$. Taken together, it appears that growth/investment and one-year-ahead earnings growth are negatively correlated due to economic fundamentals coupled with accounting recognition rules.

Because of the unusual nature of near-term earnings growth, the investment/growth argument suggests that low-growth/accrual firms tend to have higher earnings growth in year $t+1$ than high-growth/accrual firms. The persistence argument also predicts higher earnings growth in year $t+1$ for low-accrual firms. Therefore, the investment/growth and persistence arguments have similar predictions of year $t+1$ earnings growth for low- and high-accrual firms. I hope to distinguish between these two alternative views by examining the cross-sectional variation in the relationship between earnings growth and accruals. If accruals and one-year-ahead earnings growth are negatively correlated because of the unusual effect of investment/growth on near-term earnings growth, the growth argument suggests that the negative relationship should be stronger when accruals are more likely to capture the growth information. If earnings growth and accruals are negatively correlated due to the lower persistence of accruals, then the persistence argument suggests that the negative relationship should be stronger when accruals are less persistent.

The first block of Table 9, Panel A presents empirical results on the relationship between one-year-ahead earnings growth and accruals across four *COVAR* groups. I find that the negative correlation between accruals and one-year-ahead earnings growth, as measured by the difference in earnings growth between Q5 and Q1 (the Q5–Q1 hedge portfolio), increases monotonically from −3.65 percent (t = −7.57) in the bottom *COVAR* group to −4.63 percent (t = −9.01) in the top *COVAR* group, resulting in a difference of 0.98 percent (t = 1.97) between these two groups. These results support the investment argument. The first block of Panel B reports the results across three *PERS* groups. Consistent with the persistence argument, I find that the negative relationship between accruals and one-year-ahead earnings growth is stronger when accruals are less persistent. The earnings growth differentials between Q5 and Q1 are −4.71 percent (t = −8.28) and −1.29 percent (t = −1.35) for the least and most persistent groups, respectively, resulting in a difference of −3.24 percent (t = 2.82) between these two groups.[21] Therefore, the cross-sectional analysis generates mixed evidence, as both the investment and persistence arguments are supported by the data.

To address the issue that the effect of investment on future earnings is likely to last more than a year and to bypass the unusual effect of investment on near-term earnings growth, I turn to the relation between accruals and longer-term earnings growth, for which investment/growth and persistence have opposite predictions. The investment/growth argument predicts that high-accrual/growth firms tend to have higher longer-term earnings growth than low-accrual/growth firms if the transitory year t earnings are appropriately controlled for. To the extent that persistence affects longer-term earnings (recall that the

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[21] As discussed in Section IV, the most persistent group has considerably fewer observations than other groups. As a robustness check, I partition the sample into four equal-size *PERS* groups similar to Panel A. The Q5–Q1 hedge portfolio has earnings growth of −4.51 percent (t = −8.06), −4.62 percent (t = −8.28), −4.19 percent (t = −7.66), and −3.49 percent (t = −6.85) for *PERS1* (least persistent), *PERS2*, *PERS3*, and *PERS4* (most persistent) groups, respectively. The difference in earnings growth between *PERS1* and *PERS4* is −1.02 percent, with a t-statistic of 1.68.

TABLE 9
Cross-Sectional Variation in the Relation between Earnings Growth and Accruals

Panel A: The Relation between Earnings Growth and Accruals across Four *COVAR* Quartiles

	Earnings Growth across Five Accrual Quintiles For:			
	The Bottom *COVAR* Quartile	**The Second *COVAR* Quartile**	**The Third *COVAR* Quartile**	**The Top *COVAR* Quartile**
One-year-ahead earnings growth based on actual earnings:				
Q1	2.51%	3.19%	3.39%	3.40%
Q2	0.35%	0.35%	0.37%	0.42%
Q3	0.09%	−0.39%	−0.02%	0.09%
Q4	−0.25%	−0.33%	−0.35%	−0.35%
Q5	−1.14%	−1.31%	−1.12%	−1.23%
Q5–Q1	−3.65%	−4.50%	−4.51%	−4.63%
	(−7.57)	(−6.80)	(−9.47)	(−9.01)
Ex ante longer-term earnings growth based on analysts' forecasts:				
Q1	19.61%	20.46%	18.21%	16.89%
Q2	16.79%	18.03%	16.95%	15.41%
Q3	16.92%	18.61%	18.07%	16.34%
Q4	18.10%	21.10%	20.54%	18.43%
Q5	22.10%	24.25%	24.04%	22.94%
Q5–Q1	2.49%	3.79%	5.83%	6.05%
	(3.48)	(3.82)	(9.03)	(6.73)
Ex post longer-term earnings growth based on actual earnings:				
Q1	2.43%	1.99%	1.52%	2.12%
Q2	2.53%	2.12%	1.99%	1.91%
Q3	2.32%	1.86%	2.08%	2.11%
Q4	1.66%	2.60%	2.79%	2.62%
Q5	2.20%	3.47%	3.24%	3.69%
Q5–Q1	−0.23%	1.48%	1.71%	1.57%
	(−0.40)	(3.14)	(3.52)	(3.70)

Panel B: The Relation between Earnings Growth and Accruals across Three *PERS* Groups

	Earnings Growth across Five Accrual Quintiles For:		
	Accruals are Less Persistent than Cash Flows ($\beta_1 < \beta_2$)	**No Difference in Persistence ($\beta_1 = \beta_2$)**	**Accruals are MORE Persistent than Cash Flows ($\beta_1 > \beta_2$)**
One-year-ahead earnings growth based on actual earnings:			
Q1	3.34%	2.95%	2.08%
Q2	0.47%	0.40%	1.72%
Q3	−0.14%	0.06%	−0.96%
Q4	−0.41%	−0.25%	0.62%
Q5	1.37%	−0.83%	0.79%
Q5–Q1	−4.71%	−3.78%	−1.29%
	(−8.28)	(−7.93)	(−1.35)

(*continued on next page*)

TABLE 9 (continued)

	Earnings Growth across Five Accrual Quintiles For:		
	Accruals are Less Persistent than Cash Flows ($\beta_1 < \beta_2$)	**No Difference in Persistence ($\beta_1 = \beta_2$)**	**Accruals are MORE Persistent than Cash Flows ($\beta_1 > \beta_2$)**
Ex ante longer-term earnings growth based on analysts' forecasts:			
Q1	20.18%	17.41%	16.21%
Q2	17.74%	15.71%	15.88%
Q3	18.40%	15.84%	15.70%
Q4	21.11%	17.35%	16.05%
Q5	25.20%	21.19%	19.46%
Q5–Q1	5.02%	3.78%	3.22%
	(6.14)	(6.20)	(2.85)
Ex post longer-term earnings growth based on actual earnings:			
Q1	2.12%	2.18%	3.54%
Q2	2.08%	2.01%	2.00%
Q3	1.95%	2.19%	2.55%
Q4	2.94%	2.14%	3.53%
Q5	2.99%	3.25%	3.21%
Q5–Q1	0.87%	1.07%	−0.33%
	(1.82)	(2.75)	(−0.24)

This table reports the average changes in earnings across five accrual quintiles for four *COVAR* groups (Panel A) and three *PERS* groups (Panel B), where *COVAR* (the co-variation between accruals and growth) and *PERS* (the accrual persistence relative to cash flows) are defined in Table 3. One-year-ahead earnings growth is defined as $(E_{t+1} - E_t)/TA_t$, where E is income before extraordinary items and TA is total assets. *Ex ante* longer-term earnings growth is proxied by analysts' forecasts of long-term earnings growth, and *ex post* longer-term earnings growth is defined as $((E_{t+1} + E_{t+2} + E_{t+3})/3 - (E_{t-1} + E_{t-2} + E_{t-3})/3)/((TA_{t-1} + TA_{t-2} + TA_{t-3})/3)$.
The sample period is from 1967 to 2001.
t-statistics in parentheses are Fama-MacBeth t-statistics.

accrual anomaly lasts for at least three years [Sloan 1996]), the persistence argument suggests that high-accrual firms should have lower future earnings growth. I use analysts' forecasts of long-term earnings growth as a proxy for earnings growth, as this variable is not subject to the effect of transitory earnings. I also construct an *ex post* earnings growth measure using the average earnings over the next three years minus the average earnings over the past three years, scaled by the average total assets in the past three years, $\frac{(E_{t+1} + E_{t+2} + E_{t+3})/3 - (E_{t-1} + E_{t-2} + E_{t-3})/3}{(TA_{t-1} + T_{t-2} + TA_{t-3})/3}$.[22] I skip year t earnings to avoid the confounding effect of transitory earnings discussed earlier.

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[22] Both practical and academic papers often use average earnings across years to mitigate noise (e.g., Asness 2003; Campbell and Vuolteenaho 2004). To ensure the robustness of my results, I try a variety of earnings growth measures by varying the length of future earnings and the base earnings. Specifically, future earnings are the simple average of either three-year or five-year earnings. The base earnings take the following format: (1) The average of earnings in years $t-1$, $t-2$, and $t-3$ $((E_{t-1} + E_{t-2} + E_{t-3})/3)$; (2) The average of earnings in years $t-1$ and $t-2$ $((E_{t-1} + E_{t-2})/2)$; (3) Earnings in year $t-1)(E_{t-1})$; and (4) Earnings in year $t-2(E_{t-2})$. I find that *ex post* long-term earnings growth increases fairly monotonically with accruals for all specifications except for the E_{t-1} case. When E_{t-1} acts as the base earnings, earnings growth has a "U" shape with accruals in the sense that both low- and high-accrual firms have higher earnings growth than medium-accrual ones. This "U" shape gets weaker for working capital accruals and the inventory component of accruals. I also find similar patterns of these earnings growth variables when partitioned by employee growth.

The second and third blocks in Table 7 report longer-term earnings growth across five quintiles based on employee growth, sales growth, accruals, and refined versions of accruals. As predicted by the investment hypothesis, high-accrual/growth firms have higher future earnings growth (both *ex ante* and *ex post*) than low-accrual/growth firms. For example, the bottom employee growth quintile has average expected earnings growth of 15.69 percent, compared to 26.22 percent for the top employee growth quintile. The *ex post* earnings growth increases monotonically from 0.51 percent in the bottom employee growth quintile to 4.25 percent in the top employee growth quintile. Similar patterns exist for accruals and their refined versions (working capital accruals and the inventory component). In sum, longer-term earnings growth increases with accruals and standard growth variables, a result supporting the investment hypothesis but not the persistence hypothesis.

As a final test, I examine cross-sectional variation in the relationship between accruals and longer-term earnings growth. The investment argument suggests that the positive relationship is stronger when accruals are more likely to capture investment information. The second and third blocks in Table 9, Panel A show that the positive relationship, as measured by the earnings growth differential between Q5 and Q1, increases monotonically with the level of *COVAR*. For example, the Q5–Q1 difference based on analysts' forecasted earnings growth is 2.49 percent (t = 3.48) for the bottom *COVAR* quartile and 6.05 percent (t = 6.73) for the top *COVAR* quartile, resulting in a difference of 3.55 percent (t = 3.57) between these two quartiles. Similar results hold for the *ex post* measure of earnings growth. Overall, these results suggest that future earnings growth increases more with accruals when accruals co-vary highly with employee growth, a result consistent with the investment argument. The last two blocks in Table 9, Panel B show the relationship between accruals and earnings growth across three *PERS* groups. On average, earnings growth increases (though not monotonically) with accruals in each *PERS* group. In terms of magnitude, the bottom *PERS* group seems to have the most positive correlation between accruals and earnings growth, while the persistence argument suggests the most negative correlation for this group. In general, the empirical results do not support the persistence argument.

In summary, I find mixed evidence from the earnings analysis in distinguishing between the investment and persistence arguments. One-year-ahead earnings growth is higher for low-accrual (low-growth) firms than for high-accrual (high-growth) firms. The results from the cross-sectional analyses support both the investment and growth arguments, suggesting that the evidence is inconclusive in distinguishing between these two alternative views. Using longer-term earnings growth measures, I find that both *ex ante* and *ex post* earnings growth increases with accruals, and this increase is stronger when accruals co-vary with employee growth, a result supporting the investment argument but not the persistence argument. In both one-year-ahead and longer-term earnings growth analyses, the earnings patterns are remarkably similar when partitioned on accruals and standard growth measures, such as employee growth, suggesting that accruals are likely to capture economic fundamentals rather than just earnings persistence/quality.

V. ROBUSTNESS CHECKS

In this section, I conduct a number of robustness checks to test cross-sectional variation in the accrual anomaly by using alternative *COVAR* and *PERS* measures, alternative accrual measures, and alternative portfolio formation techniques. I also examine the relationship between future stock returns and other growth attributes.

The *COVAR* Measure Based on Co-Variation between Accruals and External Financing

The main analysis uses the co-variation between accruals and growth in the number of employees to measure *COVAR*. In this section, I use external financing as an alternative growth attribute to estimate *COVAR* and examine its implications for the accrual anomaly. Compared to sales growth, assets growth, and other growth variables, external financing is relatively free of accounting subjectivity (see e.g., Richardson et al. 2005) and thus provides clean evidence on the investment hypothesis. Untabulated results show that the coefficient estimate of *COVAR*ACC* is −2.00 in Model (9), with a t-statistic of −2.36. Robust results on external financing provide further evidence that the investment information contained in accruals explains the accrual anomaly.

Accruals from the Statement of Cash Flows

Prior literature (see Hribar and Collins 2002) indicates that the accrual measure estimated from the balance sheet suffers from measurement errors. From the economic perspective, accruals based on the cash flow statement serve to measure organic growth in working capital. The investment hypothesis suggests that accruals based on the balance sheet offer a better measure of growth because they reflect both organic growth and growth via mergers and acquisitions. Additionally, there is an inconsistency between the accrual measure based on the cash flow statement and other growth measures based on the balance sheet, such as growth in the number of employees and external financing.[23] Nevertheless, I conduct some robustness checks using the accrual measure based on the cash flow statement. The coefficient of *COVAR*ACC* is significantly negative, regardless of whether employee growth or external financing is used in the *COVAR* measure, a result supporting the investment hypothesis (see Table 10). The coefficient of *PERS*ACC* is insignificantly negative in each case, which is inconsistent with the persistence hypothesis. One caveat is in order. These results should be interpreted with caution, given that only 15 years of time-series data about the cash flow statement are available.

I also conduct other robustness checks, such as using alternative portfolio formation techniques, alternative industry definitions, and alternative persistence measures. The results are qualitatively similar in each case.[24]

Anomalies Based on Different Growth Attributes

This paper shows that accruals represent one aspect of firms' business growth and, thus, co-vary with other growth attributes. One implication of this study is that these growth attributes should have similar predictive power for future stock returns. Table 11 reports average returns of ten deciles based on the following growth variables: accruals, employee growth, external financing, capital expenditures, and cash sales growth. In each case, future

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[23] For growth in the number of employees, I cannot distinguish organic growth from growth via mergers and acquisitions in Compustat data.

[24] Specifically, I conduct the following three sets of robustness checks. First, in portfolio analysis, the magnitude of the accrual anomaly is measured by returns of the hedge portfolio with a long position in the bottom 30 percent stocks and a short position in the top 30 percent stocks, as opposed to the 20 percent specification in the current research design. Second, in industry-based tests, I use the Fama and French (1997) industry definition, as opposed to the two-digit SIC industry specification in the current research design. I also try the three-digit North American Industry Classification System (NAICS) industry specification. Finally, I consider alternative accrual persistence measures, such as the difference between the coefficients on accruals and cash flows divided by the sum of the coefficients, the coefficient of accruals in univariate regression of earnings on accruals, the coefficient of accruals in Regression (8), and the accrual coefficient when regressing accruals on their lagged value.

TABLE 10
Robustness Check—Accruals Based on Cash Flow Statement

Independent Variables	1	2	*COVAR* = *COVAR(EMPGR)* 3	*COVAR* = *COVAR(EMPGR)* 4	*COVAR* = *COVAR(XFIN)* 5	*COVAR* = *COVAR(XFIN)* 6
Intercept	0.130	0.127	0.132	0.134	0.143	0.144
	(2.49)	(2.21)	(2.34)	(2.27)	(2.15)	(1.99)
ACC	−0.208	−0.148	−0.113	−0.043	−0.066	0.031
	(−3.90)	(−2.06)	(−1.26)	(−0.43)	(−0.69)	(0.33)
PERS		0.008		−0.004		0.000
		(0.25)		(−0.11)		(0.01)
*PERS*ACC*		−0.108		−0.080		−0.136
		(−1.04)		(−0.64)		(−1.14)
COVAR			0.016	0.017	−0.005	−0.008
			(0.84)	(0.71)	(−0.15)	(−0.26)
*COVAR*ACC*			−0.243	−0.288	−0.348	−0.390
			(−1.97)	(−2.34)	(−2.35)	(−2.82)
Adj. R^2	0.003	0.006	0.004	0.008	0.006	0.009

The dependent variable is annual stock returns beginning from the fifth month after a firm's fiscal year-end. *COVAR* is the co-variation between accruals and growth, which is proxied by either growth in the number of employees or external financing, and *PERS* is the relative persistence of accruals to cash flows. Specifically, each year I calculate the co-variation between accruals and growth (*COVAR*) and the accrual persistence relative to cash flows (*PERS*) for each two-digit SIC industry based on two most recent years' data (a minimum of ten observations) using the following three regressions:

$$ACC_t = \alpha_0 + \alpha_1 EMPGR_{t-1} + \alpha_2 EMPGR_t + \alpha_3 EMPGR_{t+1} + e_t$$
$$ACC_t = \alpha_0 + \alpha_1 XFIN_{t-1} + \alpha_2 XFIN_t + \alpha_3 XFIN_{t+1} + e_t$$
$$E_t = \beta_0 + \beta_1 ACC_{t-1} + \beta_2 CF_{t-1} + e_t$$

where E = income before extraordinary items scaled by average total assets; CF = cash flows (data308) scaled by average total assets; ACC = accruals measured as earnings minus cash flows; $EMPGR$ = growth in the number of employees; and $XFIN$ = external financing measured as changes in equity and debt minus net income scaled by average total assets.

COVAR(EMPGR) is $\alpha_1 + \alpha_2 + \alpha_3$ from the first regression, *COVAR(XFIN)* is $\alpha_1 + \alpha_2 + \alpha_3$ from the second regression, and *PERS* is $\beta_1 - \beta_2$ from the third regression. Both *COVAR* and *PERS* are transformed into percentile rankings and converted to a [0,1] scale, where rankings are obtained by annually ranking observations and assigning them in equal numbers to 100 portfolios. All other variables are winsorized at 1 percent and 99 percent.

The sample includes 41,157 observations from 1989 to 2003.

t-statistics in parentheses are Fama-MacBeth t-statistics.

stock returns decrease fairly monotonically from decile 1 to decile 10, and the D1–D10 hedge portfolio achieves an average return of more than 10 percent. While some of these anomalies have been individually studied in prior literature (e.g., Sloan 1996; Titman et al. 2004), the evidence documented in this paper suggests that these anomalies might be related to each other, as all the underlying variables capture a firm's business growth. Additionally, the return pattern based on employee growth has not been previously documented. Finally, the fact that the Fama-French three-factor model cannot fully explain the accrual anomaly (e.g., Fairfield et al. 2003) might suggest that accruals or other accounting-based measures capture a firm's investment/growth information better than the book-to-market ratio.

TABLE 11
Stock Anomalies Based on Different Growth Variables

	The Anomaly Based On:				
	ACC_t	$EMPGR_t$	$XFIN_t$	$CAPEXP_t$	$CSGR_t$
D1 (low)	20.71%	20.33%	21.44%	21.18%	17.87%
D2	18.88%	20.29%	20.31%	19.03%	18.16%
D3	17.55%	18.44%	19.61%	17.69%	17.99%
D4	17.98%	16.26%	20.98%	17.00%	17.28%
D5	16.41%	16.79%	19.08%	16.51%	16.84%
D6	17.22%	15.89%	16.29%	15.16%	17.85%
D7	15.33%	15.50%	13.95%	15.22%	16.49%
D8	14.25%	14.60%	12.29%	13.82%	16.41%
D9	11.81%	12.37%	9.97%	12.30%	13.26%
D10 (high)	8.25%	9.37%	4.14%	8.81%	7.82%
D1–D10	12.46%	10.96%	17.30%	12.37%	10.05%
	(5.75)	(4.08)	(6.00)	(5.18)	(4.60)

This table reports future annual returns across ten deciles based on the following growth variables: Accruals (*ACC*), growth in the number of employees (*EMPGR*), external financing (*XFIN*), capital expenditures (*CAPEXP*), and cash sales growth (*CSGR*). See Table 1 for detailed definition.
Annual return begins from the fifth month after a firm's fiscal year-end.
The sample period is from 1964 to 2003.
t-statistics in parentheses are Fama-MacBeth t-statistics.

VI. CONCLUSION AND LIMITATIONS

In this paper, I investigate the fundamental investment information contained in accruals and examine its implications for the accrual anomaly. By definition, accruals capture investment in working capital, which is an integral part of corporate growth. Consistent with the conventional wisdom, I find that accruals co-vary strongly with growth in the number of employees, investment in fixed assets, external financing, and other growth attributes, suggesting that accruals capture economic fundamentals rather than just earnings persistence/quality. The fundamental investment information contained in accruals goes well beyond that captured by contemporaneous sales growth.

I argue that the fundamental investment information contained in accruals has a first-order effect on the accrual anomaly. Any intentional or unintentional measurement problems associated with accruals induced by the accounting system, such as the subjectivity of accrual measures or earnings management, are likely to have a second-order effect. I examine different implications of fundamental investment and accrual persistence for cross-sectional variation in the accrual anomaly and find results consistent with my predictions. In particular, I find that, consistent with the investment hypothesis, the accrual anomaly varies across industries in a predictable way based on a firm's business model. There exists a strong accrual anomaly in industries/firms in which accruals co-vary with employee growth. On the other hand, the accrual anomaly is much weaker in industries/firms in which accruals show little correlation with employee growth. In contrast, earnings persistence exhibits no explanatory power for cross-sectional variation in the accrual anomaly. If anything, I find that the magnitude of the accrual anomaly increases with the persistence of accruals relative to cash flows, a result going against the persistence argument. From the earnings perspective, accruals/growth are negatively related to one-year-ahead earnings growth and the evidence on cross-sectional analysis is inconclusive. The intermediate/long-term earnings growth increases with accruals and this increase is stronger when accruals co-vary with employee growth, supporting the investment argument but not the persistence argument. These results are robust to alternative accrual measures and other model specifications.

This paper proceeds with certain limitations. First, the empirical results support the investment/growth hypothesis that the investment information contained in accruals explains the accrual anomaly, but this paper is silent on the mechanism behind the results, i.e., the reason why investment/growth is negatively related to future stock returns. The hypothesis development section mentions several explanations: investor over-extrapolation, overinvestment, and financial distress risk. Second, this paper uses both cross-sectional and time-series approaches to estimate the co-variation between accruals and other growth attributes (*COVAR*), but each approach has its own limitations. The cross-sectional approach assumes homogeneity in the same industry, and the time-series approach excludes young and growth firms from the sample. As in the cases of accruals and firm size, an ideal *COVAR* measure should be at the firm level with no restrictions on the sample data. Future research may help to address this issue.

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Whither Accounting Research?

Anthony G. Hopwood
University of Oxford

I think that there is a growing sense of unease about the state and direction of accounting research. Although articulated in a variety of different ways in a number of different contexts, there nevertheless is a view that accounting research has become insufficiently innovative and increasingly detached from the practice of the craft. As I am sympathetic with only some of these emerging concerns, I intend to give a quite explicitly personal view of the field of accounting research as it has emerged and as it might develop—a highly selective one and, at times, a somewhat idiosyncratic one. But as I do not have the time to be comprehensive, my aim is to provide a personal account of some of my enthusiasms, my dismays, and some of my suggestions. Although partial, my account is also meant to be well intentioned.

I start with some personal reminiscences. I came to the United States as a Fulbright Scholar in 1965. Arriving in the port of New York on board the Queen Mary on a delightful autumn day (travel by boat then being a requirement of the Fulbright Commission), I was already full of anticipation about my forthcoming studies at the University of Chicago. The late 1960s were tremendously exciting times for accounting research in that institution and possibly for intellectual and cultural life generally in the United States. Certainly for accounting at Chicago, new knowledge was in the process of being created. As I arrived, Bill Beaver had just finished his doctorate and had joined the faculty, as had Gene Fama in the finance area. I still remember standing on the steps of the Business School building with Joel Demski as he waited for the results of his doctoral defense. Phil Brown was already two years into the accounting doctoral program, and Ray Ball and Ross Watts arrived a year after me. The future Nobel Prize winner Myron Scholes was still working on his doctorate in the finance area, as were Marshall Blume and Mike Jensen. I studied finance with Merton Miller, industrial organization with George Stigler, and macroeconomics with Milton Friedman, all of whom were to go on to receive Nobel Prizes. To top it all, after one year I decided to drop finance, the ultimate of heresies, to pick up behavioral science and organizational sociology, studying with such great names as Peter Blau and Morris Janowitz.

It really was an exciting time. Knowledge almost literally was moving before your very eyes. Indeed there was a quite explicit awareness that understandings were in the process of changing, an impression that was reinforced by the fact that you could still experience

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Editor's note: The Executive Committee of the American Accounting Association has recommended the commission of a series of Presidential Research Lectures, to be delivered at annual meetings of the Association. To encourage broad dissemination, the Committee has requested that *The Accounting Review* publish this lecture given at the 2006 American Accounting Association Annual Meeting in Washington, D.C.

both the old and the new knowledges in both accounting and finance. At the very same time as doctoral theses were starting to explicate new approaches to accounting research, incoming doctoral students still had to study the earlier American traditions of accounting theorizing as they had emerged throughout the twentieth century. Indeed in this way I actually met Carl Devine and even took a course from Bill Vatter. Similarly in finance, the new sat alongside the old, at least for a time. While M.B.A. students could study with Miller and Fama, they still had access to the old chartist knowledges of the likes of Marshall Ketchum. It was indeed a time of transition.

Of course, Chicago was not the only site for the creation of the new accounting knowledge. Related developments were going on elsewhere. Berkeley, Carnegie Mellon, and Minnesota come to mind, but interestingly not Columbia, Harvard, Stanford, and Wharton, at least at that time.

As part of the development of my argument, I want to emphasize a number of aspects of the research culture and environment at that time, at least as I remember them.

In accounting, the creation of the new knowledge was largely a revolution from below. Certainly at Chicago so much of the significant research was done by doctoral students, be they Ray Ball, Bill Beaver, Philip Brown, Joel Demski, Ross Watts, or even myself. Of course the faculty were not irrelevant. George Sorter did a brilliant job recruiting doctoral students from all around the world in his capacity as Director of the Doctoral Program. David Green's focus on empirical research was also crucial. Remember this was the time of the first Empirical Research in Accounting Conference organized by a still new *Journal of Accounting Research.* Additionally a young Nick Dopuch was an enthusiastic supporter of all the new developments, be they economic or behavioral. But the real sense of excitement resided with the doctoral students who seemed to live a life of new research horizons and continual research discussions. For believers in the nonhierarchical nature of good research cultures, accounting research at Chicago at this time provides an excellent example.

Strong normative beliefs drove a great deal of those early inquires. Ball, Brown, and particularly Ross Watts were deeply concerned about the monopolistic pretensions of what was then still called the accounting profession. As a result of this, there undoubtedly was an interest in showing that accounting functioned in a competitive information environment alongside other sources of corporate information. Indeed, the pioneering Ball and Brown (1968) study sought to demonstrate just that, and the subsequent "Market for Excuses" paper co-authored by Watts (Watts and Zimmerman 1979) developed out of related concerns with the consequences of the monopolistic tendencies of a professionalized accounting. I also had the very strong view that management accounting had to be studied in the contexts in which it operated and, therefore, literally fought to be allowed to do field research in accounting, something that was a very novel idea at that time at Chicago and most likely elsewhere. The suggested compromise of an experimental study collapsed after a trial attempt using Ray Ball, Ross Watts, and others as experimental subjects descended into hilarity: perhaps such subjects don't have to be that bright! So for a variety of reasons, positive accounting research (Watts and Zimmerman 1978) emerged from a deeply normative context.

The new accounting research was also strongly interdisciplinary in orientation. New fields of inquiry often are in both the sciences and the social sciences. Fama's research on efficient markets emerged at the interface of finance, economics, and statistics. Similarly for the endeavors of Ball and Brown, and my own research (Hopwood 1973) utilized the insights and approaches of social psychology and organizational sociology as well as accounting. Often located at the margins of the established disciplines (Miller 1998), the practitioners of the new often find it easier to affiliate with a diversity of understandings, feeling less of an identity with the status quo.

However, by the creation of that sense of newness, interdisciplinary inquiry makes the dissemination and publication of the new knowledge more difficult. That certainly was the case for the pioneering and hugely influential Ball and Brown study. It was rejected by *The Accounting Review* and published in the Chicago-based *Journal of Accounting Research* by default, the reason for the rejection being that it was not accounting.

I want to emphasize this point. There were then, there have been in the intervening period, and there are now people who think that they know what accounting—and auditing for that matter—is. How wrong these people are. They are the ones who list the attributes of the *status quo*, seemingly wanting to confine the new to being within the boundaries of the old. They have no conception that accounting and accounting research have repeatedly changed across time, and when things change they become what they were not, at least in part. Accounting has been a craft that has had no essence. It has changed significantly across time, adopting new forms, methods, and roles. Likewise for accounting research. Historically, it too has developed in relation to a diverse series of circumstances and pressures, taking on different forms in different places and at different moments of time, repeatedly adopting approaches that were novel and contentious. Moreover, both accounting and accounting research will continue to do just that, regardless of the pleas and efforts of those who act in the name of the *status quo*. Indeed the very role of accounting research is in part to make both accounting and our knowledge of it different—to move forward our understandings of accounting and, at times, the practice of accounting itself.

In finance, in particular, we have seen how research not only models the financial world, helping us to understand its inner dynamics and processes, but also changes the functioning of finance in operation. Finance in practice is now different from what it used to be as a result of finance research. The resultant knowledge has played a significant role in the creation of new markets in options, the emergence of new financial instruments, and very different approaches to the management of financial risk. Indeed finance research has been constitutive of finance itself, a phenomenon that is the theme of a recent book of immense significance by MacKenzie (2006).

Ideally, accounting research should have the same potential, but I think that any such potential is still weakly developed, although by no means absent.

On a more contemporary note—and one related to some of the later themes in this discussion—I am convinced that the present-day equivalent of the Ball and Brown paper, albeit something very different in content and intellectual positioning, would still be rejected by *The Accounting Review* because there are still too many people who think that they know what accounting and accounting research are and should be. That in itself is something on which we should all ponder. But in all probability the situation today is even worse than that. While in the late 1960s the newly launched *Journal of Accounting Research* could take a risk with publication; in my estimation, that would be much less likely now. For both that journal and the *Journal of Accounting and Economics* have become more focused and less innovative than they used to be. They have entered the mainstream with all the costs associated with that.

Another development arising from the new wave of Chicago research is that accounting research started to embrace the study of not only accounting itself, but also accounting's consequences and its modes of functioning in wider institutional settings. That indeed was one of the key points of the Ball and Brown analysis: that accounting functioned in a competitive market in information on the enterprise. Accounting, in other words, is part of a wider whole—a market in information on the enterprise and the economic and business contexts in which it operates—and to understand accounting one needs to understand that wider whole and its ties to and implications for accounting. My own research in the area of management accounting (Hopwood 1973) was similar, illustrating the need for an understanding of the ways in which the wider organizational structure and culture mediated the use made of accounting data and, thereby, their consequences.

Of course, the danger is that such research developments have produced two types of accounting researchers who tend not to communicate with one another. On the one hand, we have those who can research the consequences of accounting, be it with a capital market or behavioral emphasis. Such researchers currently represent the mainstream of accounting research. On the other hand, however, are those who have a thorough understanding of accounting itself and can reflect on its internal logics and the possibilities for these to change. Such researchers tended to be more in vogue from the 1930s until the period in the 1960s that witnessed the intellectual developments we have just discussed. In an ideal world, researchers having such obviously complementary interests and skills would communicate and collaborate, but that has very rarely happened. We tend to have one emphasis or the other despite the fact that both are needed.

A final observation on the new program of accounting research initiated at Chicago relates to how it furthered the development of a more abstract and a more global form of accounting inquiry that was and is very different from earlier traditions of American accounting research. American accounting research used to be a form of intellectual inquiry that was tied to the institutional and philosophical traditions of America. In other words, it was deeply embedded in the country of its creation, its history, institutions, and intellectual traditions. Movement to a different cultural context was not easy for any such form of national intellectual tradition because it necessitates the re-establishment of the often quite specific intellectual and institutional linkages that sustained the particular form of inquiry in its original setting. Little such nationally focused accounting research is now conducted, at least in the United States. The approach can still be found in the field of accounting history where there are scholars who ground their research in traditions of American pragmatism and whose inquires are still sympathetic to the types of institutional understandings that were significant in earlier American intellectual traditions. But elsewhere a more generic, less contextualized version of accounting research flourishes. Itself the product of a diversity of intellectual influences, such research has few ties to any particular cultural context or the norms of the specific institutional settings in which it emerged. Indeed, without such ties, this new form of accounting research can and does travel. Although emergent in the United States, it can just as easily be conducted in Europe and Asia—and is. A novice can be initiated into its traditions and practices within the context of a three of four-year doctoral program. That time could not possibly produce a practitioner of German philosophy, for instance, a subject that is still tied very strongly to the local institutional traditions of the settings in which it emerged.

Such a detachment from context has both advantages and disadvantages. Yes, knowledge can travel, perhaps initially loosely attaching itself to new settings, although that does not preclude a more substantial integration as it has few specific institutional or intellectual preconditions or requirements. The widespread dissemination and adoption of modern finance knowledge illustrates this so well. But there can be costs associated with the displacement and loss of local vernacular traditions of inquiry and investigation. Global knowledges are often not very tolerant of local ones and yet sometimes they experience difficulty embedding themselves into the detail of local institutional contexts: the new knowledges remaining only loosely coupled to the settings in which they operate and thereby unable to infuse the functioning of practice.

But enough of the past and some of the issues and implications that emerge from it—many of which still have a very significant impact on contemporary accounting research.

The subsequent 30 or so years have seen enormous changes in the world of accounting itself and a new set of questions are arising as to the appropriateness and nature of the contemporary accounting research endeavor. Let me therefore quickly review some of the most significant changes in the world of practice that might be driving the demands for new accounting knowledge.

In financial accounting we have witnessed a rapid rise in regulation and the associated pressures for greater standardization. As a result of this, a new institutional realm of accounting dialogue has been created that had few precedents in the past. Many more people now talk, contemplate, and act on accounting as well as and often instead of merely doing it. Accounting now has a domain of policy making as well as one of practice. New possibilities have thereby been created for the transference of accounting ideas and vocabularies. People can argue for particular accounting treatments, appealing to more abstract criteria for the selection of specific accounting alternatives. The emergence of new understandings of the rationales for accounting practice can create different possibilities for its modification and change. The new institutional realm of accounting regulation thereby provides a platform for mediating between the research community and that of direct practice, as the debates on fair value accounting and mark-to-market illustrate, although as yet we have few understandings of how this occurs and the means by which it can be furthered.

Accounting, both financial and managerial, also has to grapple with a more complex commercial and institutional world. Such processes of adaptation are certainly not new as the histories of accounting's struggle to relate to a more capital-intensive capitalism have demonstrated. But in recent decades accounting has had to try to respond to changing employment practices and forms of remuneration, more complex organizational forms and designs, changing configurations of organizational interrelationships and moves to a more knowledge based economy with consequent shifts in the forms in which corporate advantage is gained and maintained. And new issues are emergent, not least those that might stem from a world that is more conscious of the pressures for sustainability. Accounting practice is still trying to grapple with the backlog of pressures on it to change and in a world where many of these changes will be mediated by the regulatory authorities, the demand for new more abstract insights into the possibilities for a different accounting craft become ever greater.

At the same time as these pressures have been developing, that other important institutional component of the accounting world, the audit firm, has itself been subject to fundamental change. Audit firms are not only much more international, indeed more international than the practice of accounting, and fewer in number, but they also are much more explicitly commercial in orientation. If they ever existed, the days of a more professionalized practice have now certainly gone. The audit industry, as it might more accurately be called, is now a much more significant component of the institutional setting for accounting practice, making much stronger demands on the regulatory authorities and introducing its own dynamic into the relationship between the corporate world and that of accounting.

Just as the audit firms are now more international in scope, so is accounting itself—both financial and managerial. The regulation of accounting has entered the supranational domain. Corporate accountings are often multinational in nature and innovations in managerial accounting seem to pervade the world in record time, increasingly akin to a form of fashion, no doubt propagated by management consultancies, some key ones of which are now part of the audit firms.

Within the enterprise, accounting has rapidly become a less isolated phenomenon as it has become embedded in massive, more generic enterprise wide management systems. It is now quite explicitly a part of a wider whole. At the same time, there also has been a significant diffusion of economic calculation throughout the whole enterprise. Accounting is now practiced by many others than just accountants. The forms of economic calculation that it creates are now a part of the functioning of operations, marketing, and a multitude of other departments in the firm.

It has to be recognized that accounting research has experienced difficulty keeping up with these profound changes. Indeed, this is one of the main reasons why more and more questions are being asked about the state of the research art. We know very little about the processes and consequences of standardization and the accountings for new phenomena, let alone new issues that are emerging in the areas of different organizational forms, sustainability and so on. Our international understandings are still very poorly developed, to put it positively. In the management accounting area, we still have the most minimal of understandings of the processes and pressures underlying the shifting locations of economic calculation and control.

Faced with such a complex and exciting agenda, increasingly accounting research is being seen as too cautious and conservative, too rigid and traditional, and insufficiently attuned to grapple with the new and to embrace novel insights and bodies of knowledge. Rather than being excited about the emerging gaps in our knowledge, it is as if the academic accounting community prefers to focus on the leads that arise from within the existing research traditions. The dynamic for change and transformation that emerged in the early Chicago days is seemingly no longer with us.

Of course, it needs to be pointed out that accounting is not alone in this respect. One of the advantages of being the dean of a business school, which I was until recently, is that it gives you a good overview of the state of knowledge across the whole field of management. From such a perspective it is clear that there are many similar deficiencies elsewhere. Indeed, as dean, I used to say repeatedly that while business itself is so interesting, many business schools are so boring! Responding to the shifting nature of the world of practice has been a particular problem for the older more functional areas of management—operations, marketing, and accounting.

The research community has invested insufficiently in mechanisms for engaging with the ever-changing world of practice. No longer recruiting so heavily from those with a background in the practice of the art, the world of research has become an increasingly autonomous one with the primary conversations being internal to the community rather than of a more heterogeneous nature. Even within the academic world, accounting scholars seem to relate primarily to themselves. At least that is the suggestion that emerges from citation studies (Biehl et al. 2006). We seem to have become more cautious about incorporating new perspectives, new insights, and new interdisciplinary involvements. Yet if innovation and new understandings are more prone to emerge from the margins of the subject that are in touch with different perspectives and bodies of knowledge, then accounting research seems to have become too stable and insufficiently innovative in a changing world. Why should that be? I think that a number of factors are involved, both personal and institutional.

Returning to a point I made earlier, I think that the accounting academy has too many people who think that they know what both accounting and accounting research are and should be. Perhaps this is not surprising, for accountants are those who like clarity and focus. But I would argue that the world of knowledge is not like that, nor should it be. For knowledge to be a source of illumination rather than dogma, it must have a dynamic of change. Seen from such a perspective, accounting, as a practice, can be and indeed should be constantly examined, re-examined, interrogated, and criticized within the world of knowledge. Rather than being a discipline in its own right, accounting needs to draw on a variety of sources of illumination and understanding. It has been and must continue to be a site for interdisciplinary inquiry.

More substantively, another reason why accounting research is in its current situation relates to the dual roles that it serves within the academy. Yes, research is a means of satisfying our intellectual curiosity. As such, curiosity-oriented research serves to enlighten us as to the nature, origins, modes of operation, and consequences of the multiplicity of aspects of the accounting domain. But research also functions as a means of career management. Obviously, the two roles are related and, in many senses, they should be. However, as many of us are very well aware, there can be and are tensions between these different roles.

One reason for the dynamism of the American university system is the competition between different institutions for funds, talented students, and the most talented faculty. The role of research in career progression and reputation building is an important part of that competitive process, and as such should be valued. Indeed it is preferable to the more bureaucratic accreditation of research that has developed in the United Kingdom and increasingly elsewhere, a process that is subject to all manner of forms of regulatory capture.

But the role that research plays within the career management system also has its dangers. Many of these stem from the fact that it is becoming increasingly clear that almost the only consumers of accounting research are fellow accounting researchers. The accounting research community has become ever more internally focused and self-referential, and thereby less subject to a diversity of pressures and interests that would be created if there were more active consumers of new accounting knowledge.

The implications of this are numerous. The very strong career emphasis in research planning encourages conservatism and conformity—doing the next safe thing and staying within recognized intellectual parameters. Only the minority seem to cast their aspirations at a much higher level, consciously striving to develop a reputation for innovation. The risks associated with such a strategy can be very high and perhaps are getting higher. For the remaining majority, prevailing approaches, particularly methodological ones, are milked to the very last drop. With so very few members of the academic community seemingly having a license to innovate—to break the mold, new methodological approaches tend to attract a large number of followers. When observing the phenomenon in action, I always think of the words in the libretto of Handel's *Messiah* "All we like sheep ..." On this basis, capital market and event studies went on and on, eventually looking at the most minor of issues. Take the pioneering research of Ball and Brown (1968). Yes, it has been influential. But in many senses its influence has been primarily a methodological one. Despite the mass of studies that have been based on it, we still have little more insight into the nature of the wider competitive markets in corporate information that were one of its key observations. Just how does accounting relate to and interact with other sources of corporate information? How do those other sources function? Of even greater potential interest would be an understanding of the ways in which information markets might vary by sector and company. But very little of such research has been done, requiring as it might a delving into the underlying dynamics of the Ball and Brown findings rather than the reproduction of their methods. Similarly audit judgment research went way past the point of declining utility; the current wave of investigations into earnings management shows all the signs of proceeding on the basis of the availability of data and methods rather than a deeper intellectual curiosity.

A similar preference for conformity also exists on the part of a particularly influential group of users of the outcomes of research, the deans, chairs of tenure committees, departmental chairs, and so on. For among this community there is often a preference for research that stays within well-established intellectual boundaries and that uses well-understood and easily verifiable methods. For such research is more readily interpretable by those outside the discipline. For as Power (1997) has so ably demonstrated in his important study, *The Audit Society*, auditing, which is akin to at least some of the processes that enter into career monitoring and evaluation, creates pressures to make things auditable. So, in this setting, field studies are seen as less verifiable and more difficult to assess than quantitative analyses, experimental methodologies, and simple theorizations, even though that might not be the case. Certainly they are adequately evaluated in other disciplines and the alternatives have as many difficulties associated with them below their apparent surface of ease of comprehension. Equally, pressures can arise to stay within well-established disciplinary boundaries. Keeping within the conceptual landscapes already existing within business schools may thereby be preferred to excursions into anthropology, postmodern sociology, or political science.

More recently a form of institutional careerism has reinforced these tendencies as deans and their colleagues seek to develop research and publication portfolios that perform well in media rankings, accreditation evaluations, and state-sponsored research assessments. In practice these institutional developments tend to result in the same concerns with both the volume and legitimacy of publications. The emphasis is placed on journal articles rather than monographs and chapters in books, regardless of the roles different forms of publication can play in different disciplines and at different stages of the research process. Moreover, that emphasis on journal publications can very easily reinforce the pressures for conformity that are operating at the individual level.

The accounting academic world also seems to attract those of a more cautious predisposition. Certainly, we are witnessing the effects of some quite strong intellectual biases and prejudices that are consistent with this. Keep away from politics, even the political science of standard setting, seems to be one. Sociology is seen by many as being too close to socialism, even though in the United States it would be possible to argue that the opposite has been the case. The seeming unwillingness to invest in understanding the factors that increase the validity of field studies and qualitative investigations is a further example, particularly when compared with the apparent ease with which the equally complex world of laboratory experimentation is accepted. Yet if these and other similar biases were articulated against gender, race, ethnicity, or sexual orientation, then all hell would break loose. But seemingly it is still all right to have intellectual prejudices. That is most likely right in a free society, but it is less right when its consequences are imposed by some on others.

The net result of all these pressures is that accounting is currently left with a research community whose members are, in my view, too conservative, too intellectually constrained, too conformist, and insufficiently excited by and involved with the changing practice or regulation of the craft. But what, if anything, can be done about this? That is a very big and difficult question.

One real solution would be to loosen the ties of careers to research, but I am convinced that this will not happen. Yet it could be very sensible to do so. For if you look at the publisher's exhibition displays at most academic accounting gatherings, particularly those in the United States, and compare them with those at similar events for other academic disciplines, it is clear that the primary interest of many accounting academics is teaching. Research in this context is only a means to a different end. Further evidence for this is the high percentage of accounting faculty who cease researching on gaining tenure, turning instead to textbook writing and consultancy. Once again, research is a means to another end. Without any doubt, having so many people focusing on research almost solely as a means rather than an end seriously distorts the research process.

Given that in the present institutional context, we will have to live with research being so strictly tied to the career progression of so many people who have little real interest in it, other ways need to be found to disturb the *status quo*. Could this emerge, one wonders, if there were more links to the community of practice so that accounting could be seen in its full diversity and complexity? Increasingly I think that this might be easier to achieve through the development of relationships with industry and commerce or even the regulatory authorities rather than through the audit industry given the rapid decline in the number of thought leaders in the audit firms.

Organizations like the American Accounting Association also have a role to play, not least with respect to their presence in the field of scholarly publication. For the American Accounting Association, I would say that now is the time for it to adopt a leadership role in the publication of accounting research. Not only should every effort be made to encourage *The Accounting Review* to embrace the new, the innovative, what accounting research might be in the process of becoming, and new interdisciplinary perspectives, but this should also be done in a way that provides both a catalyst and a model for other journals of influence. For they need encouragement, too. While the Association has done much to embrace the need for a diversity of gender and race, so far it has done relatively little to invest in intellectual diversity, even though this is not only of value in its own terms, but also an important generator of innovation and intellectual progress. I, at least, would see this as appropriate for a learned society in the modern era. The American Accounting Association should set itself the objective of becoming an exemplar of intellectual openness and thereby innovation.

Such a mode of operation is not unknown in the academic community. A number of years ago the British Library, the national repository for printed materials in the United Kingdom, undertook a study of the editorial processes of basic research journals, what it termed primary communications, on the basis that these were the places where new knowledge started to enter the public arena (Gordon, undated). Focusing on a number of major international research journals edited in the United Kingdom that covered the full spectrum of bodies of knowledge, the study thereby was able to investigate the differing editorial processes in the pure and applied sciences, the human and social sciences, and the humanities. At one point in the study, the editors of the journals were given a choice between two types of errors. Were they more concerned to ensure that they did publish studies that might be seen as path-breaking in the future or was their emphasis placed on ensuring that the problematic studies of today were not published? Interestingly, the science editors were more concerned with maintaining the future innovative capacity of their journals, knowing that the nature of scientific advance is such that studies are continually challenged and revised. "It's quite normal," said one of the science editors, "science is like that, it progresses by exposing other people's mistakes." In contrast, the social scientists tended to be more concerned to maintain the accuracy of the present.

Accounting is quite obviously in the latter category. But one wonders if it need be. Wouldn't it be possible to embrace both the desire to maintain the integrity of present research while recognizing the dynamism and thereby changing nature of knowledge? I am sure that this is what the very best of scientific journals should do and it is an aspiration that should be shared and practiced by accounting research journals.

One final suggestion is also in order. It is vital that these issues continue to be discussed and debated. The difficulties that we face are ones that are deeply embedded in complex institutional structures. Change will not be easy, but it will be more likely to occur if we maintain a dialogue and debate. As believers in an open society we should practice what we preach and continue to talk about our problems and challenges. Keep at it!

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BOOK REVIEWS

Stephen A. Zeff, Editor

Editor's note: Two copies of books for review should be sent to the Book Review Editor: Stephen A. Zeff, Rice University, Jesse H. Jones Graduate School of Management, 6100 Main St., Houston, TX 77005. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

CECIL W. JACKSON, *Business Fairy Tales: Grim Realities of Fictitious Financial Reporting* (Mason, OH: Thomson/South-Western, 2006, pp. iv, 281, $39.95).

This engaging book by Cecil Jackson, a professor of clinical accounting at the University of Southern California, is aimed at the general public, and will appeal to individual investors who are looking for some guidance on how to avoid losing money on the next Enron. The book will also be of interest to those looking for a one-stop detailed explanation of the business scandals that bankrupted Enron, WorldCom, and Sunbeam.

In the book, Jackson takes on the challenging task of explaining the complex accounting "schemes" used by managers at companies such as Enron and WorldCom to manipulate financial statements. Other recent books that have attempted to do the same include *Financial Shenanigans* by Howard Schilit (2002), now in its second edition, and *The Financial Numbers Game* by Charles Mulford and Eugene Comiskey (2002). These books, while also aimed at the general public, are generally more useful to an audience that has some financial acumen. By comparison, Jackson's book adopts a more populist exposition style similar to a *BusinessWeek* or *Fortune* article, which makes it potentially more accessible to a wider audience.

The book is well organized, and Jackson covers a large set of business scandals. Chapter 1 provides a brief (perhaps too brief) introduction to "fictitious" financial reporting schemes (consistent with the "fairly tales" term in the book's title) and provides a list of the top 20 "fictitious" schemes used by companies to manipulate financial statements. The three major business scandals—Sunbeam, WorldCom, and Enron—are covered in detail in Chapters 2, 4, and 6, respectively. These chapters are intermixed with three shorter chapters (Chapters 3, 5, and 7) that provide an overview of an assortment of 11 business scandals (including Xerox, Rite Aid, and Adelphia). Chapter 8 provides a discussion of the pension accounting "fantasy." It is a readable summary of the difficulties in interpreting pension disclosures, although this chapter does not focus on any corporate business scandals per se and so does not quite fit with the remainder of the book. Finally, Chapter 9 concludes with a review of the various post-2001 reforms, such as the Sarbanes-Oxley Act of 2002 and the lessons learned from these business scandals.

For each of the three major business scandals covered in the book, Jackson starts with an explanation of the business and the personalities involved, which should help the reader understand the business context that led managers to manipulate the financial disclosures. These introductory sections essentially restate or summarize material from other original sources, such as investigative reports and Congressional hearings. For example, the WorldCom chapter relies heavily on the three reports of the WorldCom bankruptcy examiner. Similarly, the initial sections of the Enron chapter are essentially based on original research and information presented in the Enron bankruptcy examiner's reports, the investigative report commissioned by the board of directors, and books such as Kurt Eichenwald's *Conspiracy of Fools*. Nevertheless, Jackson adds value here by condensing these sources into a brief and readable summary of the business context and managerial motivations for the accounting schemes.

Jackson then provides a step-by-step explanation of the various accounting tricks or schemes used by the companies. These are arguably the most valuable parts of the book for readers who want to understand the accounting issues involved in the scandals. He follows this analysis with some helpful pointers on how individual investors could have used simple financial analysis techniques to potentially avoid investing in these affected companies. The "signals" of financial manipulations highlighted by Jackson are generally simple enough that readers without much financial acumen or training would feel encouraged to attempt a similar analysis of annual reports and other company filings. On the other hand, the book presents the signals in a somewhat *ad hoc* fashion. Although the final chapter provides a helpful summary of the top 25 list of signals, the readers might be confused by the lack of common structure underlying these signals and conclude that a financial statement red-flag analysis of the kind presented in the book is perhaps beyond their reach. In Jackson's defense, the accounting schemes discussed in the book varied widely in their level of complexity, and it maybe that it is not possible to present the signals of those schemes in a systematic way. Additionally, a future edition of the book might consider adding a primer early in the book on the basic tools of financial statement analysis that one would need to identify similar signals in other companies, and also perhaps provide a readable summary of the recent accounting research on the use of accruals and various scoring models (such as the M-Score) to quantify the risk of earnings manipulation.

While Sunbeam, WorldCom, and Enron get an extended discussion in the book, Jackson provides a brief but informative analysis of 11 other business scandals, including some, such as Livent, that have not been covered much in the business press. As before, Jackson presents both an analysis of the accounting schemes and a helpful review of the financial reporting signals that could have been used by investors to spot the effects of the schemes in the financial statements. Not everyone will agree that all of the business scandals covered in these chapters really qualify as business fairy tales. For example, Jackson provides a brief review of Lockheed Aircraft's difficulties with the development of the TriStar wide-body jet program in the 1970s and the company's alleged failure to take a timely asset impairment charge when the program ran into technical difficulties. One could question if this was really a business scandal of the same scale and impact as WorldCom's illegal capitalization of operating lease costs. Like Lockheed, many of the mini-scandals in these chapters are also quite dated. In a future edition, Jackson might want to replace these short reviews of old scandals with a detailed discussion of one or more recent and larger business scandals. One could choose from the business scandals from the dot-com bubble era, such as the revenue recognition issues at AOL Time Warner and InfoSpace, or from other recent, and more complex, business scandals such as Tyco, HealthSouth, and Fannie Mae.

On a final note, it is interesting that all of the business scandals covered by Jackson involve American companies. In this era of global trade and global investing, investors ought to be aware that the risk of loss from financial reporting manipulation exists throughout the world, and it would have been useful for Jackson to have included one or two large international business scandals, such as Parmalat. Overall, however, most readers of this book will find that there are lots of valuable accounting tips and lessons in this book, presented in a readable, story-telling fashion.

BALA G. DHARAN
Professor of Accounting
Rice University

GEORGE J. BENSTON, MICHAEL BROMWICH, ROBERT E. LITAN, and ALFRED WAGENHOFER, *Worldwide Financial Reporting: The Development and Future of Accounting Standards* (Oxford, U.K.: Oxford University Press, 2006, pp. vi, 326).

This book is interesting and well written. The authors, who have collaborated before (Benston et al. 2003), provide us with an unusually broad range of backgrounds: U.S. university, U.K. university (and former standard setter), U.S. research institute, Austrian university. Despite the reference to "Accounting Standards" in the book's title, the coverage is much broader, including laws and enforcement mechanisms.

The central chapters (4 to 8) look at financial reporting and its regulation in the U.S., U.K., Germany, the European Union, and Japan. These have an authoritative feel. Whereas I normally expect to find errors in such chapters, here I do not, largely because of the geographical diversity and quality of the authors, who presumably had their work well reviewed. Unusually, the book has no preface, that would have told us who had been helpful in that way and, for example, about the book's intended purpose and market.

The peripheral chapters (1 to 3, 9 to 11) are more difficult to assess. Chapters 1 to 3 are fairly short and certainly hold one's attention. Chapter 1's summary is sometimes a bit misleadingly brief. For example, it says that "the current move to fair value accounting by some standard-setters is not desirable" (p. 15) but in Chapters 2 and 11, we find that really the authors are arguing for a mix of asset measures, which seems rather like the *status quo*, that the Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB) have no published plans to upset substantially.

Chapter 3 examines the roles and usefulness of standards. This includes such topical issues as principles versus rules. On pages 41–42, a contrast is made between the old "professional" standard setters (e.g., presumably the Accounting Principles Board and the International Accounting Standards Committee [IASC]) and the newer "more widely representative ones" such as the FASB and the IASB. The old ones are said to be too slow, dependent on borrowed staff, too parochial, and with no power or will to enforce standards. The new ones are said to be better for the reverse of those reasons and because they have interested parties other than accounting firms and they have full-time staff and directors.

However, is that a fair contrast of the IASC and the IASB? I suggest not. The final five years of the IASC saw a deluge of standards (Camfferman and Zeff 2007, Chap. 11). In its last years, the IASC had full-time direction and a substantial full-time staff, many of whom were not borrowed from firms. The IASC could hardly be said to have been parochial. It directly involved (and held board meetings in) far more countries than the IASB does. The IASC was certainly worried about enforcement and said so publicly many times in the late 1990s. The IASB has no more power to enforce than the IASC had. Finally, several of the IASC Board's delegations contained no members of audit firms and nearly all contained some delegates who were not from such firms. There were analysts, finance directors, full-time national standard setters, and academics.

On the same pages, the authors say that the Securities and Exchange Commission (SEC) "has delegated" its responsibility to the American Institute of Certified Public Accountants and now to the FASB. I have been taken to task before (by the book review editor of this journal) for saying such words, because the SEC cannot legally do such a thing. Instead, it regards the standards of the FASB as having authoritative support, for the moment.

Chapter 9 makes a largely convincing assessment of diversity. There is a conventional conclusion that countries can be classified by reference to legal systems and financing systems, leading to U.K./U.S. and Germany/Japan groupings for the book's four countries. This leads to contrasts in corporate governance models and in the purpose of accounting (investor decisions versus stewardship and creditor protection). Apparently, however, Germany and Japan do not fit together for audit regulation because in Japan that is "governed by law and government agencies" (p. 201). However, surely that is also true of Germany, where audit is governed by law (the Wirtschaftsprüferordnung) and the Wirtschaftsprüferkammer, which is supervised by the Ministry of Economics. Again, perhaps the contrast is too brief to be clear.

Chapter 9 includes a conclusion that a "major weakness in all countries is the lack of enforcement across the financial regulation systems" (p. 211). However, that does not seem to be what the chapter says earlier about the U.S. or the U.K., and it says that it is too early to tell on other issues (pp. 204–206).

An inevitable problem is that the field moves fast. So, a book that says: "In 2005, stock-market-listed corporations in all the European countries *will have* to" use International Financial Reporting Standards (IFRS) (p. 79, emphasis added), contains a number of out-of-date points (e.g., several parts of the IFRS/U.S. comparison in Chapter 9).

Chapters 10 and 11 draw things together in an interesting way, making conclusions on the book's various themes. The main issue for Chapter 10 is whether there can be and should be a single set of global accounting standards. The authors conclude in the negative in both cases. However, I would have separated two issues more completely: (1) whether all listed companies' consolidated statements can/should have the same standards, and (2) whether those standards need to apply for other national purposes (e.g., tax and distribution based on unconsolidated statements). The chapter (e.g., in the middle of p. 231) sometimes conflates the issues.

In my view, it is possible to apply the same set of standards globally for listed companies' consolidated statements, although practice might continue to be somewhat varied within that. National standards are increasingly irrelevant for such statements, so differences between those sets of standards are also not relevant. Further, most of the examples of difficulty between the IASB and the FASB (e.g., pp. 231, 232) have already been resolved or there are plans to resolve them. The SEC announced in 2007 the likely removal of the reconciliation requirement and the possibility of allowing U.S. firms to use IFRS. It is *desirable* to apply the same set of standards because there is increasingly a single capital market.

The authors discuss competition in accounting standard-setting among nations and among exchanges, but these versions of competition are now largely irrelevant for listed companies except for the U.S. The authors also argue for firm-choice between sets of standards. This might be about to happen in the U.S., and it would probably lead to the demise of U.S. GAAP or to an IASB/FASB merger. So, in the medium term, it too will lead to less competition.

It does, of course, make sense to have different standards for different purposes: e.g., IFRS for German consolidated statements, but German GAAP for tax and distribution calculations. However, that is not competition between standards. Also, different national standards will survive for the tax/distribution purpose, but that is not competition between standards either.

Chapter 11 sums up on major themes, such as the asset/liability versus the expense/revenue approach; the use of fair value; voluntary versus mandatory disclosures; and the recognition of intangible assets.

All in all, this book makes interesting reading and is recommended for practitioners, academics, and senior students.

CHRISTOPHER NOBES
Professor of Accounting
Royal Holloway, University of London

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CAPSULE COMMENTARIES

By the Book Review Editor

DALE. L. FLESHER, *The History of AACSB International, Volume 2: 1966–2006* (Tampa, FL: AACSB International, 2007, pp. 211).

This is a continuation of the history of the American Association of Collegiate Schools of Business, which was published in 1966 by Richard D. Irwin, Inc. Today, AACSB stands for Association to Advance Collegiate Schools of Business, the proactive sounding name adopted in 2001.

Dale Flesher begins by reviewing the first 50 years' history and then presents an overview of the next 40 years' developments. In the chapter on accreditation, he discusses the controversy provoked by the American Institute of Certified Public Accountants' advocacy of professional schools of accountancy in 1973 and how it prompted the AACSB to launch its accreditation of accounting programs.

The author has compiled a comprehensive history, which includes 16 factual appendices and an extensive list of references.

AILEEN PIERCE, *Ethics and the Professional Accounting Firm: A Literature Review* (Edinburgh, Scotland: The Institute of Chartered Accountants of Scotland, pp. xiii, 185).

The author's purpose is to synthesize the ethics literature on the professions, professionalism, and professional firms. The first chapter discusses the public interest focus of professions and the firms, and discusses the evolving nature and role of the accounting firm. Professional ethics codes and enforcement are taken up in the second chapter, followed by the longest chapter, dealing with the ethical dilemmas and challenges that have come to confront the accounting firms in recent times. Such issues as firm culture, audit quality, and auditor independence are treated in the context of the intensifying commercial pressures on professionalism in accounting.

At the close, the author provides an extensive list of references.

RICHARD ANDREWS, *Impairment of Assets: Measurement Without Disclosure?* Research Report No. 92 (London, U.K.: Certified Accountants Educational Trust, 2006, pp. 54).

This research study examines the treatment of impairment losses in 79 companies' 2004 annual reports drawn from the FTSE 350 in the U.K. The author, an academic at Leeds Metropolitan University, judges the companies' disclosure practices in the light of Financial Reporting Standard No. 11, *Impairment of Fixed Assets and Goodwill*, issued by the U.K. Accounting Standard Board. In 2005, U.K.-listed companies became subject to IAS No. 36, *Impairment of Assets*, under the terms of the IAS Regulation in the European Union.

The author found that 62 percent of the 79 companies did not explain how the impairment loss was calculated, and 40 percent did not disclose a reason for the impairment. The extent of the narrative discussion increases with the magnitude of the impairment loss. He also found that 58 percent of the 79 companies reported an impairment of goodwill and that goodwill was the largest asset in terms of the value of impairment loss.

Editorial Data

The following table contains information about turnaround time for manuscripts (including revisions) on which editorial decisions were made in the 12-month period ended December 31, 2006. Turnaround time is the number of days between the date that the manuscript was received *and the date of the editor's letter to the author(s).*

	Number of Manuscripts	Percent	Cumulative Number	Cumulative Percent
0 ≤ Days ≤ 30	68	16.23	68	16.23
31 ≤ Days ≤ 60	173	41.29	241	50.96
61 ≤ Days ≤ 90	110	26.25	351	83.77
91 ≤ Days ≤ 120	52	12.41	403	96.18
121 ≤ Days	16	3.82	419	100.00
Total	419	100.00		

The mean review time was 58.66; the median review time was 56 days.

New Submissions by calendar year (January 1 to December 31)

1992	241
1993	234
1994	231
1995	195
1996	230
1997	195
1998	196
1999	239
2000	260
2001	260*
2002	324
2003	327
2004	307
2005	389
2006	413

* 2001—in addition to the 260 regular submissions, 68 MSs were submitted to the *TAR* Quality of Earnings Conference.

The acceptance rate (defined as number of MSs accepted divided by the number of new submissions) over the past 5 years is between 12–16% per year.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal ... No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

The primary criterion for publication in *The Accounting Review* is the significance of the contribution an article makes to the literature.

The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

Reviewers and associate editors are responsible for providing critically constructive and prompt evaluations of submitted research papers based on the significance of their contribution and on the rigor of analysis and presentation. Associate editors also make editorial recommendations to the editor.

MANUSCRIPT PREPARATION AND STYLE

The Accounting Review's manuscript preparation guidelines follow *The Chicago Manual of Style* (15th ed.; University of Chicago Press). Another helpful guide to usage and style is *The Elements of Style*, by William Strunk, Jr., and E. B. White (Macmillan). Spelling follows *Webster's Collegiate Dictionary.*

FORMAT

1. All manuscripts should be printed in 12-point font on one side of 8½ × 11" good quality paper and be double-spaced, except for indented quotations.
2. Manuscripts should be as concise as the subject and research method permit, generally not to exceed 7,000 words.
3. Margins of at least one inch from top, bottom, and sides should facilitate editing and duplication.
4. To promote anonymous review, authors should not identify themselves directly or indirectly in their papers or in experimental test instruments included with the submission. Single authors should not use the editorial "we."
5. A cover page should show the title of the paper, the author's name, title and affiliation, email address, any acknowledgments, and a footnote indicating whether the author would be willing to share the data (see last paragraph in this statement).

Pagination: All pages, including tables, appendices and references, should be serially numbered. Major sections should be numbered in Roman numerals. Subsections should not be numbered.

Numbers: Spell out numbers from one to ten, except when used in tables and lists, and when used with mathematical, statistical, scientific, or technical units and quantities, such as distances, weights and measures. For example: *three days; 3 kilometers; 30 years.* All other numbers are expressed numerically.

Percentages and Decimal Fractions: In nontechnical copy use the word percent in the text.

Hyphens: Use a hyphen to join unit modifiers or to clarify usage. For example: *a well-presented analysis; re-form.* See *Webster's* for correct usage.

Keywords: The abstract is to be followed by four keywords that will assist in indexing the paper.

ABSTRACT/INTRODUCTION

An Abstract of about 100 words should be presented on a separate page immediately preceding the text. The Abstract should concisely inform the reader of the manuscript's topic, its methods, and its findings. Keywords and the Data Availability statements should follow the Abstract. The text of the paper should start with a section labeled "I. Introduction," which provides more details about the paper's purpose, motivation, methodology, and findings. Both the Abstract and the Introduction should be relatively nontechnical, yet clear enough for an informed reader to understand the manuscript's contribution. The manuscript's title, but neither the author's name nor other identification designations, should appear on the Abstract page.

TABLES AND FIGURES

The author should note the following general requirements:

1. Each table and figure (graphic) should appear on a separate page and should be placed at the end of the text. Each should bear an Arabic number and a complete title indicating the exact contents of the table or figure. Tables and figures should define each variable. The titles and definitions should be sufficiently detailed to enable the reader to interpret the tables and figures without reference to the text.
2. A reference to each graphic should be made in the text.
3. The author should indicate by marginal notation where each graphic should be inserted in the text.
4. Graphics should be reasonably interpreted without reference to the text.
5. Source lines and notes should be included as necessary.

Equations: Equations should be numbered in parentheses flush with the right-hand margin.

DOCUMENTATION

Citations: Work cited should use the "author-date system" keyed to a list of works in the reference list (see below). Authors should make an effort to include the relevant page numbers in the cited works.

1. In the text, works are cited as follows: authors' last name and date, without comma, in parentheses: for example, (Jones 1987); with two authors: (Jones and Freeman 1973); with more than two: (Jones et al. 1985); with more than one source cited together (Jones 1987; Freeman 1986); with two or more works by one author: (Jones 1985, 1987).
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Dye, R., B. Balachandran, and R. Magee. 1989. Contingent fees for audit firms. Working paper, Northwestern University, Evanston, IL.

Fabozzi, F., and I. Pollack, eds. 1987. *The Handbook of Fixed Income Securities*. 2nd edition. Homewood, IL: Dow Jones-Irwin.

Kahneman, D., P. Slovic, and A. Tversky, eds. 1982. *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, U.K.: Cambridge University Press.

Porcano, T. M. 1984a. Distributive justice and tax policy. *The Accounting Review* 59 (October): 619–636.

———. 1984b. The perceived effects of tax policy on corporate investment intentions. *The Journal of the American Taxation Association* 6 (Fall): 7–19.

Shaw, W. H. 1985. Empirical evidence on the market impact of the safe harbor leasing law. Ph.D. dissertation, The University of Texas at Austin.

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OCTOBER 2007 PLACEMENT ADS

The deadline for information to be included in the "Placement Information" section is two months prior to the date of publication. The ***Review*** *is published in January, March, May, July, and October. Placement advertising and replies should be sent to the American Accounting Association, 5717 Bessie Drive, Sarasota, FL 34233-2399, ATTENTION: ADVERTISING DEPT. All replies to box numbers should be on separate sheets to facilitate forwarding.*

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506 BOWLING GREEN STATE UNIVERSITY, Department Accounting/MIS seeks applicants for tenure-track positions in Accounting at the Assistant, Associate, or Full Professor rank beginning Fall 2008. Preference will be given to candidates with teaching and research interests in financial reporting, auditing, accounting information systems, or tax. Demonstrated commitment to teaching, research, and service is expected with an established record being required for senior rank appointment. Applicants should send a resume, three recommendation letters, and a transcript from your doctoral program to: Dr. Ken C. Snead, Chair, Department of Accounting and MIS, Bowling Green State University, Bowling Green, OH 43403-0250. The committee will not accept electronic or fax submissions. A complete version of this ad can be reviewed at: http://www.cba.bgsu.edu/amis. BGSU is an Equal Employment Opportunity/Affirmative Action employer and encourages applications from women, minorities, veterans and individuals with disabilities.

507 UNIVERSITY OF ST. THOMAS, Minneapolis/St. Paul, MN invites applicants for a tenure-track Accounting position starting Fall 2008. All areas are needed. The University of St. Thomas offers a BA, M.B.A., and M.S. in Accountancy. See our website at: http://www.stthomas.edu. Candidates should have a Ph.D. or be ABD (with completion by Summer 2008), D.B.A., graduate degree in taxation, or combination of graduate degrees in law and accounting. Preference will be given to candidates who blend academic credentials and professional experience. Applicants should send a letter, *cv*, evidence of teaching ability, sample of scholarly writing, and three letters of recommendation to: Brian Shapiro, Search Committee Chair, Department of Accounting, Opus College of Business, Mail MCH 316, University of St. Thomas, 2115 Summit Avenue, St. Paul, MN 55105-1096; Email: bpshapiro@stthomas.edu. More detailed information is available at http://www.careerexchange.com/cejobs/catresponseUSTFaculty.asp. The University of St. Thomas is an Affirmative Action/Equal Opportunity Employer.

508 DEPAUL UNIVERSITY invites Professors of Accounting of all ranks at Ph.D.-granting universities to apply for the School of Accountancy and Management Information Systems Ledger & Quill Visiting Professorship. Appointment is for one to two quarters. The visiting Professor is asked to teach two-three courses in his or her field of specialty, interact on an informal basis with DePaul faculty and deliver a research seminar presentation to the faculty and Ledger & Quill alumni members. Applicants are expected to have an ongoing research agenda and to be effective teachers. In addition to salary, DePaul University and the Ledger & Quill Society will provide a housing allowance for the term of appointment and make available additional support as necessary for research. Please address inquiries to: Kelly Richmond Pope, School of Accountancy and MIS, DePaul University, One E. Jackson Blvd., Chicago, IL 60604; Phone: (312) 362-5821; or via email: kpope2@depaul.edu.

509 OKLAHOMA STATE UNIVERSITY, William S. Spears School of Business invites qualified candidates for the William S. Spears Chair in Entrepreneurship. The successful candidate will lead the school's initiatives to build a comprehensive entrepreneurship program focused on developing leading research and instructional programs at the undergraduate and graduate levels. The holder of the Spears Chair will work with a group of dedicated faculty engaged in entrepreneurship research and teaching to develop an integrated, cross-disciplinary entrepreneurship program. The chair holder is also expected to foster relationships with other programs across campus to leverage the school's expertise in entrepreneurship. In addition to working with the academic community, it is important for the chair holder to help in developing collaborative relationships with industry. Interested persons should send a *vita* to: Robert Dooley, Ph.D., Associate Dean, Spears School of Business, Oklahoma State University, Stillwater, OK 74078. Oklahoma State University is an AA/EOE employer committed to multicultural diversity.

510 MARQUETTE UNIVERSITY invites applications for one tenure-track position in Financial Accounting beginning Fall 2008. Applicants should hold a doctoral degree or be in the final stages of dissertation. The position will be filled at either the rank of Assistant or Associate Professor. The primary teaching responsibility will be in Financial Accounting at the undergraduate and graduate levels. The normal teaching load is 12 semester hours (6 hours each semester) during the first year and 15 semester hours thereafter. Salary and research support are competitive. The department has 11 full-time faculty. Marquette offers AACSB-accredited undergraduate and graduate degrees in Accounting and Business. Please send *curriculum vitae* and inquiries to: Michael D. Akers, Professor and Chair, Department of Accounting, PO Box 1881, College of Business Administration, Marquette University, Milwaukee, WI 53201-1881; Email: Michael.Akers@Marquette.edu. Marquette University is an Affirmative Action/Equal Opportunity Employer.

511 UTICA COLLEGE invites applicants for a tenure-track position in Financial Accounting at all ranks for Fall 2008. A research record commensurate with advanced rank is required for appointment at advanced rank. The primary area of specialization is Financial Accounting. Candidates should hold an earned doctorate from an AACSB-accredited institution. Professional certification is also desired. Candidates should demonstrate a strong interest in teaching and previous graduate teaching experience and distance learning experience is desired. Continued appointment requires evidence of scholarship and publication. Utica is the business and cultural center of the Mohawk Valley of upstate New York and is located in the foothills of the Adirondack Mountains. The area has excellent public schools, affordable housing, and ready access to all major northeastern cities by air, rail, and auto. Opportunities for both summer and winter recreation are abundant. Send *curriculum vitae* and list of three current references to: Dr. John Johnsen, Ph.D., Dean, School of Business and Justice Studies, Utica College, 1600 Burrstone Road, Utica, NY 13502. The position will remain open until filled. Applications from women and minorities are especially encouraged.

512 SAMFORD UNIVERSITY, School of Business invites applications for Chairperson, Department of Accounting and MIS to begin Fall 2008. Required qualifications include an earned doctorate in accounting and eligibility for tenure and appointment at the rank of Associate or Full Professor. Samford University is a private university located in the suburbs of Birmingham, Alabama with approximately 4,500 undergraduate and graduate students. The School of Business is accredited by AACSB International and hosts over 500 students in its undergraduate, M.Acc., and M.B.A. programs. Please send a cover letter, a current *vita*, and three letters of reference to: Dr. James P. Reburn, Associate Dean, School of Business, Samford University, 800 Lakeshore Drive, Birmingham, AL 35229. Samford is a Christian university with historic ties to the Alabama Baptist Convention. Please visit our website at: http://www.samford.edu/business for more information. An Equal Opportunity Employer.

513 VIRGINIA TECH, Department of Accounting & Information Systems seeks to fill one or more tenure-track positions to begin August 10, 2008. All ranks will be considered. Individuals with teaching and research interests in the areas of auditing and managerial accounting are preferred. Successful candidates will have a Ph.D. in accounting from an AACSB-accredited school, a program of scholarly research consistent with the rank applied for, and instructional capabilities at both the undergraduate and graduate levels. Information about the Department and its programs is available at www.acis.pamplin.vt.edu. Interested candidates MUST apply online at www.jobs.vt.edu (posting number 070536) and include with the electronic application a cover letter, resume, and the names of three references. Review of applications will begin July 1, 2007. General inquiries should be directed to Professor Greg Jenkins, Search Committee Chair, 3007 Pamplin Hall (0101), Blacksburg, VA 24061. Virginia Tech is an Equal Opportunity/Affirmative Action Employer.

514 UNIVERSITY OF HOUSTON, Department of Accountancy and Taxation at the C.T. Bauer College of Business invites applications for three tenure-track appointments at all ranks for Fall 2008. Applicants for senior positions should have a national reputation for scholarship, and a record of excellence in teaching at the undergraduate and graduate levels. Applicants for junior positions must have a doctoral degree prior to the appointment date and exhibit strong potential for and commitment to excellence in research and teaching. We are seeking applications in all areas of Accounting. The C.T. Bauer College of Business and the department are AACSB-accredited. Salaries are very competitive. Please send a copy of your resume, research papers, and relevant teaching materials to: Dr. Gerald Lobo, Department Chair, Department of Accountancy & Taxation, University of Houston, C.T. Bauer College of Business, 334 Melcher Hall, Houston, Texas 77204-6021; or by email to: gjlobo@uh.edu. The University of Houston is an Equal Opportunity/Affirmative Action Employer. Women, minorities, veterans and individuals with disabilities are encouraged to apply.

515 THE FORD FOUNDATION seeks a senior investment accountant. This person will perform functions necessary to insure support of the internally and externally managed equity, fixed income, and special investment portfolios. Responsible for accounting reports relating to settlement of trades and movement of securities, pricing of fixed income securities, and movement of funds between investment portfolios. Also, responsible for coordinating analysis of investment transaction types for operating, accounting, custody and reporting purposes. Responsible for the preparation of financial statements supporting schedules relating to the Foundation's investments. B.S. in Accounting or Finance. Knowledge of M.S. Office Excel & Word. Broker support experience helpful. Hiring Guidelines: $58,900–$70,300. To apply for employment, please send resume and cover letter including salary information to: Ms. Theresa Smith, 320 East 43rd Street, New York, NY 10017; or visit: http://www.fordfound.org/employment.

516 LEHIGH UNIVERSITY seeks three well-trained scholars/teachers with strong research skills to join Lehigh University's Accounting faculty in Fall 2008: one Associate Professor, eligible for a Perella Professorship, with an established research and teaching record, and two Assistant Professors, either a graduating Ph.D. or experienced Assistant Professor. All areas will be considered. A dynamic accounting department, ranked 6th best undergraduate accounting program by *BusinessWeek*, a successful M.S. in Accounting program, and the 20th best undergraduate business school according to *BusinessWeek*, are reasons to consider Lehigh. Applications will be accepted until the position is filled. If interested, send your *vita*, names of three references, and examples of scholarly work to: Dr. Parveen P. Gupta, Chair, Department of Accounting, Lehigh University, 621 Taylor Street, Bethlehem, PA 18015-3117; Email: ppg0@lehigh.edu; Phone: (610) 758-3443. Qualified women and minority candidates are especially encouraged to apply. Lehigh University is an Equal Employment/Affirmative Action Employer.

517 SIENA COLLEGE, Accounting Department invites applications for a tenure-track position beginning September 2008. Applications will be accepted and considered until positions are filled. Rank and salary are dependent upon experience and credentials. Ph.D./D.B.A. with concentration in accounting is required; relevant business experience is desirable. Research and professional development activities appropriate to academically qualified status for AACSB accreditation and School of Business mission are necessary. Teaching and research in auditing and/or advanced financial accounting is expected. Siena College is an independent liberal arts college in the Catholic and Franciscan tradition, located in New York's Capital District, in close proximity to major higher education and cultural institutions. The college enrolls 2,800 full-time students, 1,200 in the School of Business. Please forward applications to: Accounting Search Committee, c/o School of Business, Siena College 515 Loudon Road, Loudonville, NY 12211-1462. Siena College is an Equal Opportunity Employer and encourages applications from all qualified candidates.

518 FAIRFIELD UNIVERSITY invites applications for a tenure-track position beginning in Fall 2008 as Assistant/Associate Professor of Accounting in the Dolan School of Business (AACSB-accredited). Candidates must have/be near completion of a terminal degree. Professional certification in accounting is required. All teaching and research areas will be considered. Preference will be given to those who can teach in multiple areas; especially AIS and Managerial Accounting. Successful candidates will be expected to demonstrate a commitment to teaching excellence and quality research. Fairfield University is a comprehensive Jesuit university located on a 200-acre campus in Fairfield, Connecticut, one hour from New York. Please send a letter of application, *vita*, transcripts, and contact information for three references to: Dr. Dawn Massey, Chair, Accounting Department, Dolan School of Business, Fairfield University, Fairfield, CT 06824-5195; Email: dmassey@mail.fairfield.edu. Fairfield University is an Affirmative Action/Equal Opportunity Employer. Women, minorities, and persons with disabilities are strongly encouraged to apply.

519 CORNERSTONE RESEARCH a leading economic consulting firm that specializes in analyzing economic, financial, accounting, and marketing issues, is hiring for positions in Boston, MA; Los Angeles, CA; Menlo Park, CA; New York, NY; and Washington, D.C. Cornerstone Research consultants work directly with esteemed faculty experts in a distinctive "partnership" that combines the strengths of the academic and business worlds. We seek Ph.D. candidates with the ability to apply academic research to real-world issues, present concise explanations of complex analyses, and independently manage projects and junior staff. Positions are available for Ph.D. candidates and those with private sector or academic work experience. The ideal candidate will possess a strong empirical background in Financial Accounting, Cost Accounting, or Auditing, technical expertise in accounting, and excellent interpersonal skills. Send a cover letter indicating your location preference, a resume, a sample research paper, and letters of reference via email to: Associate-recruiting@cornerstone.com. See http://www.cornerstone.com.

520 MISSOURI STATE UNIVERSITY, School of Accountancy anticipates an August 2008 opening for an Assistant Professor, Associate Professor, or Professor. All areas of specialization will be considered with preference for an emphasis in one or more of the following areas: auditing, internal auditing, fraud, and systems. Online teaching experience and professional certification are preferred. Earned doctorate from an AACSB-accredited university is required. Candidates must have a sustained record of excellence in teaching, research, and service along with experience appropriate to the rank for appointment at the Associate or Full Professor level. Send a letter of application, *vitae*, samples of scholarship, evidence of teaching excellence, names and contact information of three to five professional references to: Dick Williams, School of Accountancy, Missouri State University, 901 South National Avenue, Springfield, MO 65897; Email: Accountancy@MissouriState.edu. Missouri State University is an Affirmative Action/Equal Opportunity Employer.

521 TEXAS TECH UNIVERSITY, Rawls College of Business is soliciting applications for tenure-track positions in Accounting (Assistant or Associate Professor) to begin Fall 2008. The Area of Accounting will consider all teaching interests, with preference for financial reporting, managerial, and accounting systems. Candidates must be strongly committed to both scholarly research and effective teaching at the undergraduate and master levels, and actively participate in doctoral education. Other responsibilities include participation in department, college, and university activities. Candidates must have a doctorate from an AACSB International accredited university. Salary and benefits are competitive. Interested applicants should submit letters of interest, *curriculum vitae,* and list of references to the Chair of the Recruiting Committee via email: ralph.viator@ttu.edu; or via postal mail to: Professor Ralph Viator, Area of Accounting, Rawls College of Business, Texas Tech University, Lubbock, TX 79409-2101. Review of applications will begin immediately and continue until positions are filled. The positions are subject to university approval. The Rawls College of Business is an Equal Opportunity Employer. Women and minorities are encouraged to apply.

522 TEXAS TECH UNIVERSITY, Rawls College of Business is soliciting applications for a clinical position (non-tenure-track) in Accounting (Clinical Assistant or Associate Professor) to begin Fall 2008. Appointments to a clinical position have an initial term of three years subject to review, and may be renewed for one or more successive three-year terms. The normal teaching load for clinical appointments is 6 courses per academic year. The Area of Accounting will consider all teaching interests, with preference for financial reporting, managerial, and accounting systems. Candidates must be strongly committed to effective teaching at the undergraduate and master levels. Other responsibilities include participation in department and college activities. Candidates must have a doctorate from an AACSB International accredited university and demonstrate that they are either "academically qualified" or "professionally qualified" per AACSB accreditation standards. Salary and benefits are competitive for positions emphasizing teaching. Interested applicants should submit letters of interest, *curriculum vitae,* and list of references, to the Chair of the Recruiting Committee via email to: ralph.viator@ttu.edu; or postal mail to: Professor Ralph Viator, Area of Accounting, Rawls College of Business, Texas Tech University, Lubbock, TX 79409-2101. Review of applications will begin immediately and continue until the position is filled. The position is subject to university approval. The Rawls College of Business is an Equal Opportunity Employer. Women and minorities are encouraged to apply.

523 NORTH DAKOTA STATE UNIVERSITY, College of Business (AACSB) invites applications for a tenure-track position in the Department of Accounting & Information Systems effective August 15, 2008. Rank is open depending on qualifications. Teaching responsibility is in the taxation area. Minimum qualifications: Ph.D. or D.B.A. in accounting with research and teaching potential, (ABD will be considered), good interpersonal skills, demonstrated effective written and verbal communication skills. Preferred qualifications: proven record of publications and teaching. Application Procedure: Screening will begin September 30, 2007 and continue until filled. Send application letter, *vita,* teaching evaluations and name, address, phone number of at least three references to: Dr. Bonnie K. Klamm, Search Committee Chair, PO Box 5075, NDSU, Fargo, ND 58105; Email: bonnie.klamm@ndsu.edu. NDSU is an Equal Opportunity institution. For more information: http://www.ndsu.edu/ndsu/jobs/non_broadbanded/index.shtml.

524 UNIVERSITY OF NORTH CAROLINA, CHARLOTTE, Department of Accounting, invites applications for a tenure-track position at the Assistant or Associate Professor rank beginning in Fall 2008. A primary teaching interest in managerial accounting is preferred, but other areas (audit, systems, financial) will also be considered. A Ph.D. with a major in accounting from an AACSB-accredited school or its equivalent is required. A strong commitment to excellence in high-quality research and teaching is expected. Teaching load and salary are competitive. Applications are encouraged from experienced Assistant/Associate Professors as well as new Ph.D.s or those nearing completion of their Ph.D. programs. Applications will be accepted until the position is filled. Interested candidates should apply online at: https://jobs.uncc.edu. Only electronic submissions will be accepted. Please attach the following documents with your electronic submission: a letter of interest and *curriculum vitae*. For additional information contact: Dr. Casper Wiggins, Chair, Department of Accounting; Phone: (704) 687-3620; Email: cwiggins@uncc.edu. The University of North Carolina at Charlotte is an Affirmative Action/Equal Opportunity Employer. Women, members of minority groups, and persons with disabilities are encouraged to apply.

525 CANISIUS COLLEGE, Wehle School of Business, Buffalo, New York, invites applicants at all levels for two tenure/tenure-track positions in Accounting. Applicants for the position must possess a Ph.D. with a concentration in accounting or be near completion of the dissertation. Areas of interest should be Financial, Managerial, Intermediate, Advanced, Theory, and Auditing. The Department of Accounting seeks faculty with a strong commitment to teaching excellence balanced with an active interest in scholarly research to join its nationally recognized program. Canisius offers both graduate and undergraduate accounting degrees. The Wehle School is accredited by the AACSB International. Send letters of interest and *curriculum vitae* to: Dr. Ian J. Redpath, Department of Accounting, Canisius College, 2001 Main St., Buffalo, NY 14208-1098. Canisius College, a Jesuit College, is an Equal Opportunity Employer committed to recruiting, supporting, and fostering a diverse community of outstanding faculty, staff, and students. Visit: http://www.canisius.edu/accjob

526 SANTA CLARA UNIVERSITY, Department of Accounting is authorized to hire two tenure-track Professors to begin Fall 2008. Rank and teaching interests are open, but priority will be given to Managerial, Systems, and Financial areas. Candidates for Assistant Professor should have completed or nearly completed their Ph.D. and must demonstrate capacity to undertake scholarly research publishable in leading journals and to provide quality teaching. Candidates for senior positions should demonstrate a substantial research record and evidence of teaching excellence. Direct applications/inquiries to: Dr. Yongtae Kim, Department of Accounting, Leavey School of Business, Santa Clara University, Santa Clara, CA 95053-0380: Email: y1kim@scu.edu. SCU is a private university located in Silicon Valley with competitive salaries, housing subsidies, and summer research support. More information is available at: http://www.scu.edu/accounting/. SCU is an EEO/AA employer.

527 WEBSTER UNIVERSITY, Department of Business, School of Business and Technology is seeking a qualified accounting faculty member to teach accounting courses at the Assistant Professor level, with a start date of Summer/Fall 2008, Ph.D. preferred. The successful candidate will be expected to teach undergraduate and graduate accounting courses. Webster University is an Equal Opportunity/Affirmative Action Employer. Women and minority candidates are strongly encouraged to apply.

528 FUDAN UNIVERSITY, Accounting Unit at School of Management invites applications for Associate Professor/Assistant Professor/Full Professor, starting September 1, 2007. The appointment will initially be made on a three-year fixed-term basis, with the possibility of renewal or on tenure for outstanding candidates. A competitive salary commensurate will be offered, as well as research funds and housing benefits. Applicants should have a Ph.D. degree in the relevant field from a prestigious business school and be able to teach undergraduate and graduate courses. The appointee is also expected to commit to high-quality scholarly research, submit grant proposals, and publish in top-tier academic journals. Interested candidates should submit a *cv*, a sample of research work, and arrange two confidential reference reports sent by the referees directly to: Mei Xue, Room 606, Li Dasan Building, 670 Guo Shun Road, Shanghai 200433, China; Email: hrfdms@fudan.edu.cn.

529 JACKSONVILLE UNIVERSITY, Davis College of Business invites applications for a tenure-track faculty position at the Assistant/Associate/Full Professor rank, effective Fall 2008. Preference will be given to those with an interest in Managerial Accounting, Finance, and/or Ethics. Candidates for the position must have a Ph.D. or a D.B.A. in Accounting or be significantly along in the dissertation process. Demonstrated excellence in teaching and the ability to foster productive partnerships on campus as well as in the business community are considered positive complements to the academic qualifications. The candidate will teach undergraduate and graduate courses in a five-year Accounting Program designed to prepare students to sit for the CPA exam. Please send a letter of application, *vita*, transcripts, and contact information for three references, in writing or electronically, to Dr. Bob Boylan, Coordinator, Accounting Program, Jacksonville University, 2800 University Avenue North, Jacksonville, FL 32211; Email: rboylan@ju.edu. Jacksonville University is an Equal Opportunity Educator and Employer.

530 UNIVERSITY OF NEW ORLEANS invites applications for an anticipated Assistant Professor position for Spring 2008 or Fall 2008. Preference will be given to those with teaching interests in some combination of taxation, accounting systems, auditing, financial, governmental, and managerial accounting. Candidates must have the Ph.D. with an accounting major (by May 2008 for Spring hires and December 2008 for Fall hires). Salary is negotiable and competitive. The Department offers the undergraduate accounting degree (about 500 majors) and two Master's degrees (including a Tax Option). The Department has separate AACSB accounting accreditation at both the graduate and undergraduate levels. Candidates should send a resume to: Professor Philip J. Harmelink, Chairman, Department of Accounting, College of Business Administration, University of New Orleans, New Orleans, LA 70148; Email: pharmeli@uno.edu. The University of New Orleans is a member of the Louisiana State University System and an Affirmative Action/Equal Opportunity Employer.

531 UNIVERSITY OF WISCONSIN–EAU CLAIRE, Assistant Professor tenure-track faculty position in the Department of Accounting and Finance at UW–Eau Claire, beginning August 18, 2008. Areas of teaching may include financial, managerial or governmental accounting. M.B.A. and online teaching are required. Doctorate in accounting must be received by December 31, 2008. Salary commensurate with qualifications. Professional certification and relevant work experience are considered assets. Applicants should demonstrate capacity for high-quality teaching, research, and scholarly activities. Other responsibilities include academic advising and service to the department, university, and profession. Contact Dr. D'Arcy Becker, Department Chairperson at: dbecker@uwec.edu. For priority consideration, all application materials must be received by September 15, 2007; however, screening will continue until the position is filled. Applicants must be able to legally work in the U.S. as of the first day of the contract. UW–Eau Claire is an AA/EEO employer dedicated to enhancing diversity. To learn more, visit our website: http://www.uwec.edu/acadaff/jobs/.

532 UNIVERSITY OF THE PACIFIC, Eberhardt School of Business invites applications for a non-tenure-track clinical faculty position beginning Fall 2008 in the area of Accounting. Duties Associated with the position include teaching at the undergraduate and graduate levels as well as service commitments. A Ph.D. or D.B.A. in Accounting is highly desirable. The University of the Pacific was established in 1851 as the first chartered institution of higher learning in California. It is comprised of nine schools and colleges, and is located on three campuses in Stockton, San Francisco, and Sacramento. Stockton, California, the home of Pacific's main campus, is located midway between the San Francisco Bay Area and the Sierra Nevada Mountains. Contact Dr. Eric Typpo at: etyppo@pacific.edu; Eberhardt School of Business, University of the Pacific, 3601 Pacific Avenue, Stockton, CA 95211; Phone: (209) 946-2260; Fax: (209) 946-2586. The University of the Pacific is an EEO/AA, encouraging excellence through diversity.

533 UNIVERSITY OF THE PACIFIC, Eberhardt School of Business invites applications for a tenure-track faculty position beginning Fall 2008 in the area of Accounting. Duties Associated with the position include teaching at the undergraduate and graduate levels, research resulting in refereed publications, and service commitments. A Ph.D. or D.B.A. is required. The University of the Pacific was established in 1851 as the first chartered institution of higher learning in California. It is comprised of nine schools and colleges, and is located on three campuses in Stockton, San Francisco, and Sacramento. Stockton, California, the home of Pacific's main campus, is located midway between the San Francisco Bay Area and the Sierra Nevada Mountains. Contact Dr. Eric Typpo at: etyppo@pacific.edu; Eberhardt School of Business, University of the Pacific, 3601 Pacific Avenue, Stockton, CA 95211; Phone: (209) 946-2260; Fax: (209) 946-2586. The University of the Pacific is an EEO/AA, encouraging excellence through diversity.

534 NORTH CAROLINA STATE UNIVERSITY, Department of Accounting invites applicants for a tenure-track position for Fall 2008. Preference will be given to individuals with professional experience and certifications as well as research and teaching interests in financial accounting, managerial accounting and/or audit. A doctorate (or short-term ABD status) in Accounting from an accredited university is required. The academic rank is open and the salary competitive. Candidates should demonstrate a strong commitment to research and teaching. NC State is a land grant institution located in one of the ten best cities to live and work in according to Cityrating.com. The College of Management boasts 2,800 students and offers an undergraduate and graduate degree in Accounting (including IT concentrations in both programs). Please send letter of interest and *curriculum vita* directly to: Recruiting Coordinator, Department of Accounting, North Carolina State University, Campus Box 8113, Raleigh, NC 27695-8113. Inquires can be made via email to: acctrecruiting@ncsu.edu. For ADA accommodations contact: Tina Tew at (919) 515-2256. AA/EOE. NC State University welcomes all persons without regard to sexual orientation.

535 NORTHEASTERN UNIVERSITY has openings for four tenure-track positions effective September 2008 at the Assistant or Associate Professor rank. We seek individuals holding a Ph.D. in Accounting with a commitment to excellence in teaching and research. Teaching experience in tax, cost/managerial or financial, and some business background are preferred. The position offers competitive compensation and teaching responsibilities that enable a notable level of high-impact research. Rank and salary are dependent on qualifications. Summer funding, graduate Assistants, and travel support are available. Accounting courses are offered at both the undergraduate and at the graduate levels (M.B.A., M.S./M.B.A., M.S.A., and M.S. Tax). Send a cover letter, a *cv*, and two samples of scholarly work to: Dr. Marjorie Platt, 404 Hayden Hall, Northeastern University, Boston, MA 02115; Email: m.platt@neu.edu. Northeastern University is an Affirmative Action/Equal Opportunity/Title IX Employer and welcomes applications from minorities, women, and persons with disabilities.

536 THUNDERBIRD, THE SCHOOL OF GLOBAL MANAGEMENT invites applications for a position in Accounting at the rank of Associate or Full Professor. Qualifications: Expertise in managerial accounting and financial reporting. All candidates must have a Ph.D. and a record of accomplishment in research and teaching. Preference will be given to applicants with established record of excellence in teaching, particularly in M.B.A. and Executive Education programs. International Business experience and Associate rank or higher preferred. Salary will commensurate with qualifications. The successful applicant can join Thunderbird beginning with the Spring 2008 trimester. Please send a letter of interest, a *curriculum vita*, and supporting research and teaching documents to: Ms. Cheri Hazen, Manager, Faculty Support Thunderbird, School of Global Management, 15249 North 59th Avenue, Glendale, AZ 85306-6000. For information about Thunderbird visit: http://www.thunderbird.edu/.

537 UNIVERSITY OF UTAH, School of Accounting and Information Systems invites applications for a new tenure-track faculty positions in Accounting at all ranks in any area of specialization beginning Fall 2008, pending funding and University approval. Applicants should possess a doctorate or be close to completion. Rank will be considered subject to qualifications. Salaries, research support, and teaching loads are competitive and fringe benefits are excellent. The School of Accounting and Information Systems and the David Eccles School of Business are both accredited at the undergraduate and graduate levels by the AACSB. Bachelor's, M.B.A., Masters of Accounting, and Ph.D. programs are offered. The application deadline is January 15, 2008 or until the position is filled. Please send application including dissertation proposal or working paper, *vita*, and three letters of reference to: Robert Allen, Director, School of Accounting and Information Systems, 1645 E Campus Center Dr., Room 108, University of Utah, Salt Lake City, Utah 84112. The University of Utah is an Equal Opportunity, Affirmative Action employer, encourages applications from women and minorities, and provides reasonable accommodation to the known disabilities of applicants and employees.

538 SAN JOSE STATE UNIVERSITY invites applications for Fall 2008 for tenure-track positions as Associate or Assistant Professor or temporary appointment as Visiting Professor. Positions are available in Financial/Managerial Accounting and Audit, Audit/Assurance and Accounting Information Systems, and in Taxation. The position in Taxation is open rank. The candidate must have demonstrated versatility in subject matter competencies and pedagogy. The teaching assignment is at both graduate and undergraduate levels, including traditional and accelerated formats. Funding for the positions is pending. The minimum credential requirement is ABD for tenure-track and visiting appointments. Strong preference will be given to candidates who hold a Ph.D. from an AACSB-accredited university. The application deadline is December 31, 2007 or until the position is filled. Send application letter, *vita*, teaching evaluations, and three letters of reference to: Dr. Janis Zaima, Chair, Accounting & Finance Department, College of Business, San Jose State University, One Washington Square, BT850, San Jose, CA 95192-0066; Phone: (408) 924-3490; Email: zaima_j@cob.sjsu.edu. SJSU is an Equal Opportunity/Affirmative Action Employer committed to the core values of inclusion, civility, and respect for each individual.

539 DREXEL UNIVERSITY, LeBow College of Business, the Department of Accounting is seeking candidates for a tenure-track position at the Assistant Professor rank beginning September 1, 2008. Candidates with a teaching interest in Accounting Information Systems and a primary research interest in the managerial or financial accounting areas would be preferred, however all applicants will be considered. Entry-level positions require the expectation of completing the Ph.D. before the beginning of the contract period. LeBow College of Business is fully accredited and offers undergraduate accounting, M.S. Accounting, M.B.A. with an accounting concentration, and a Ph.D. with an accounting emphasis. The Department of Accounting is in a period of exponential growth in research quality, achievement, and reputation with the addition of seven tenure-track/tenured faculty during the past three years. The Department has a rich tradition of interfacing with the Philadelphia business community through our well-established undergraduate co-op program and an active Accounting Advisory Board. Applicants should submit a *vita* and other supporting materials electronically to Professor Barbara Grein at: bgrein@drexel.edu.

540 SIMON FRASER UNIVERSITY (accredited member of AACSB International) invites applications for two tenure-track positions in any area of Accounting. Ph.D. or ABD near completion required; professional accounting designation preferred. Rank: Assistant Professor. Start Date: September 1, 2008. Application deadline: November 30, 2007 or when position filled. Positions are subject to budgetary approval. Under the authority of the University Act personal information required by the University for academic appointment competitions will be collected. Send *curriculum vitae* (electronically, PDF preferred) to: Chair_busappts@sfu.ca. Mail reference letters (printed, originals required) to: Dr. Irene M. Gordon, Chair of the Appointments Committee, Faculty of Business Administration, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, Canada V5A 1S6. All applications encouraged although Canadian citizens and Permanent residents given priority. SFU offers equal employment opportunities to qualified applicants. See http://www.sfu.ca/vpacademic/Faculty_Openings/Business_Administration.html for further details.

541 THE UNIVERSITY OF TEXAS AT ARLINGTON, Department of Accounting invites applications for tenure-track positions at the Assistant Professor rank in all areas of accounting to begin August 2008. Applicants must be close to completion or have an appropriate doctoral degree at the time of joining the faculty. All applicants are expected to have a commitment to quality research demonstrated by publishing in nationally recognized "A" journals, teaching excellence, and academic/professional service. All areas of expertise will be considered. The College of Business and Department of Accounting are both AACSB-accredited. Review of applications will begin immediately, and continue until the position is filled. A complete resume, working paper, and three reference letters should be sent to: The University of Texas at Arlington, Department of Accounting, Chandra Subramaniam, Search Committee Chair, Box 19468, Arlington, TX 76019. The University of Texas at Arlington is an Equal Opportunity/Affirmative Action Employer.

542 SYRACUSE UNIVERSITY, Lubin School of Accounting invites applications for a tenure-track faculty position at the Assistant or Associate Professor level effective fall semester 2008. Candidates are expected to have an earned Ph.D. in accounting or be near completion. Applicants at the Associate Professor level must have an accomplished record of publication. Applicants in all areas will be considered with a preference for those with an interest in financial accounting. Interested candidates should send a *curriculum vita*, research papers, evidence of teaching experience and effectiveness, and recommendations to: Professor David Harris, c/o Agnes Magnarelli, Joseph I. Lubin School of Accounting, Martin J. Whitman School of Management, Syracuse University, 721 University Avenue, Syracuse, NY 13244-2450. Applications may be sent electronically to: accsrch@syr.edu. Review of applications begins immediately and continues until the position is filled. Syracuse University is an Affirmative Action/Equal Opportunity education institution. Women and minority candidates are encouraged to apply.

543 UNIVERSITY OF NORTH TEXAS invites applications for a full-time, tenure-track faculty position in managerial accounting for the 2008–2009 academic year. The successful candidate must have an earned doctorate by August 2008 and a commitment to excellence in research and teaching. UNT is a comprehensive university, offering undergraduate, master's, and doctoral programs. The College of Business is accredited by the AACSB and the Department of Accounting has separate AACSB accreditation. More information about the department is available at http://www.coba.unt.edu/acct/. Please mail *vitae* to: Dr. Barbara D. Merino, Department of Accounting, PO Box 305219, Denton, TX 76203-5219; Email: merino@unt.edu. The University of North Texas is an Equal Opportunity/Affirmative Action Employer. We strongly encourage applications from women, minorities, and persons with disabilities.

544 UNIVERSITY OF NORTH TEXAS invites applications for a full-time tenure-track faculty position in accounting systems for the 2008–2009 academic year. The successful candidate must have an earned doctorate by August 2008 and a commitment to excellence in research and teaching. UNT is a comprehensive university, offering undergraduate, master's, and doctoral programs. The College of Business is accredited by the AACSB and the Department of Accounting has separate AACSB accreditation. More information about the department is available at http://www.coba.unt.edu/acct/. Please mail *vitae* to: Dr. Barbara D. Merino, Department of Accounting, PO Box 305219, Denton, TX 76203-5219; Email: merino@unt.edu. The University of North Texas is an Equal Opportunity/Affirmative Action Employer. We strongly encourage applications from women, minorities, and persons with disabilities.

545 UNIVERSITY OF NORTH TEXAS invites applications for a full-time, tenure-track faculty position in taxation for the 2008–2009 academic year. The successful candidate must have an earned doctorate by August 2008 and a commitment to excellence in research and teaching. UNT is a comprehensive university, offering undergraduate, master's, and doctoral programs. The College of Business has been accredited by the AACSB and the Department of Accounting has separate AACSB accreditation. More information about the department is at http://www.coba.unt.edu/acct/. Please mail *vitae* to: Dr. Barbara D. Merino, Department of Accounting, PO Box 305219, Denton, TX 76203-5219; Email: merino@unt.edu. The University of North Texas is an Equal Opportunity/Affirmative Action Employer. We strongly encourage applications from women, minorities, and persons with disabilities.

546 SOUTHERN ILLINOIS UNIVERSITY, School of Accountancy is accepting applications for two tenure-track positions (Assistant or Associate Professor) starting August 16, 2008. Accounting specialties desired are Tax and Financial, but quality applicants in other areas will be considered. Applicant must have a strong commitment to a quality research program and excellent teaching. Applicants for senior rank must have an established research record in high-quality publications. Research responsibilities will include working with doctoral students. Teaching responsibilities will include participation in the undergraduate, M.Acc., and Ph.D. programs. Applicant should have completed all requirements for the doctorate or appropriate terminal degree at effective date of employment. Submit letter of application and resume to: Dr. Julie Sobery, Search Committee Chair, School of Accountancy, Mail Code 4631, Southern Illinois University Carbondale, 1025 Lincoln Drive, Carbondale, IL 62901; Phone: (618) 453-2289; Fax: (618) 453-1411. Review of applications will begin September 1, 2007 and continue until the positions are filled. Southern Illinois University Carbondale is an Affirmative Action/Equal Opportunity employer that strives to enhance its ability to develop a diverse faculty and staff and to increase its potential to serve a diverse student population. All applications are welcomed and encouraged and will receive consideration.

547 WICHITA STATE UNIVERSITY invites applications for two tenure-eligible faculty positions beginning August 2008. Required: Ph.D./D.B.A. in Accounting (ABD considered); academically qualified for AACSB; teaching and research interests in accounting; commitment to quality teaching and research; commitment to professional community interaction; and commitment to diversity. Desirable: professional accounting experience; professional certification; teaching and research interests in either accounting information systems or taxation, consistent with the needs of the School of Accountancy. Review of applications begins October 15, 2007, and continues until filled. The position is contingent upon funding. Apply to: jeffrey.bryant@wichita.edu; or send a *curriculum vitae* to: Jeff Bryant, School of Accountancy, Wichita State University, 1845 Fairmount, Wichita, KS 67260-0087; Phone: (316) 978-6261. Wichita State University is an Equal Opportunity/Affirmative Action Employer.

548 INDIANA UNIVERSITY–PURDUE UNIVERSITY FORT WAYNE, Department of Accounting and Finance (http://www.ipfw.edu) seeks a tenure-track Assistant Professor for August 2008 whose primary teaching interest is in either Managerial Accounting or Tax. A doctorate in accounting or a related discipline is required by August 2008. The successful candidate must demonstrate both good teaching and research capabilities. Applicants should send a cover letter, *curriculum vita*, and a list of three references to: Dr. Kathy S. Pollock, Interim Chairperson, Indiana University–Purdue University Fort Wayne, Department of Accounting and Finance, 2101 E. Coliseum Blvd., Fort Wayne, IN 46805; Email: pollockk@ipfw.edu. The position will stay open until filled. IPFW is an Equal Opportunity/Equal Access/Affirmative Action university.

549 HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY (HKUST), Department of Accounting seeks applicants for a continuing non-tenure-track teaching position. The position is for one or two years beginning July 2008, and is renewable subject to mutual agreement. Candidates must possess a doctorate and an excellent teaching record. Qualified individuals in all specialty areas of accounting will be considered but teaching breadth will be valued. Certain student support and service responsibilities will be expected. Salary is competitive and based on qualifications. Send a *curriculum vitae*, three letters of recommendation, and evidence of teaching effectiveness to: acchen@ust.hk; or to: Professor Kevin Chen, Department of Accounting, Hong Kong University of Science and Technology, Clearwater Bay, Kowloon, Hong Kong.

550 NORTHERN ILLINOIS UNIVERSITY invites applications for an anticipated tenure-track opening for accountancy faculty at the rank of Assistant Professor beginning Fall 2008. We are primarily interested in candidates who have a teaching interest in Financial Accounting or Auditing. NIU offers the Bachelor of Science in Accountancy, Master of Accounting Science, and Master of Science in Taxation degrees. Information about our nationally ranked programs can be found at http://www.cob.niu.edu/accy/. Candidates must be qualified to teach at the undergraduate and graduate levels. Candidates must have, or expect to have, a Ph.D. degree when employment begins. Teaching experience, business experience, and professional certification are desirable. We are particularly interested in faculty who want to combine their research and teaching with a close working relationship with the professional business community. Applicants must send a cover letter and *curriculum vitae* to: Jim Young, Chair, Department of Accountancy, Northern Illinois University, DeKalb, IL 60115. Complete applications must be received by August 24, 2007. AA/EEO institution.

551 MIAMI UNIVERSITY, OHIO, Department of Accountancy invites applicants for a tenure-track position at the Assistant or Associate Professor level beginning fall Semester 2008. Applicants interested in any area of accounting will be considered. Applicants must have a doctorate in accounting or dissertation in process with expectation of completion of degree by December 31, 2008. Professional certification and experience are desirable. Faculty members are expected to provide both high-quality teaching and research. Salary and benefits are competitive. Both the undergraduate and graduate accounting programs are AACSB-accredited. Please submit your resume and letters from three references to: Dr. Marc A. Rubin, Department of Accountancy, Farmer School of Business, Miami University, Oxford, Ohio 45056; Email: rubinma@muohio.edu. Application screening for interviews will begin immediately. Information about the faculty and curriculum is available at: http://www.sba.muohio.edu. Campus Crime and Safety Report: http://www.muohio.edu/righttoknow, hard copy upon request. Miami University is an EOE/AA employer.

552 CASE WESTERN RESERVE UNIVERSITY, Weatherhead School of Management, invites applications for Assistant Professor of Accountancy for Fall 2008. Requirements include a doctorate in accountancy and a strong interest in research. Evidence of quality teaching is desirable. Although candidates with a specialization in any accountancy area are invited to apply, we prefer those interested in the auditing, financial, and managerial areas. Professional certification (e.g., CPA, CMA) strongly preferred. Weatherhead offers undergraduate and master's level degree programs including a B.S. in Accountancy and a Master of Accountancy. Department faculty are also heavily involved in the M.B.A. program and supervision of Ph.D. students. All programs are AACSB-accredited. Additional information can be found at http://weatherhead.case.edu/acct. Send *curriculum vita* and other materials to Elaine Iannicelli at: eri@case.edu. Women and minority applicants are especially welcome. In employment as in education, Case Western Reserve University is committed to Equal Opportunity and World Class Diversity.

553 UNIVERSITY OF MONTANA invites applications for two tenure-track positions at the Assistant or Associate Professor level beginning fall semester 2008. We are interested in candidates who have a primary teaching interest in Taxation or Accounting Information Systems along with a secondary interest in any other area. An appropriate Ph.D. must be completed prior to starting employment. Professional certification is desirable. UM offers graduate and undergraduate accounting programs separately accredited by AACSB International. Review of applications will begin immediately; position will remain open until filled. Applicants should send a cover letter, resume, and list of three references to: Terri Herron, Chair, Department of Accounting & Finance, The University of Montana, Missoula, MT 59812-6808. Please direct questions to: Professor Herron at (406) 243-5878 or terri.herron@business.umt.edu. UM is an AA/EO/ADA/State Vets Pref Employer. Criminal Background checks required of finalists. For additional information go to: http://www.business.umt.edu.

554 XAVIER UNIVERSITY, Williams College of Business, a Catholic university in the Jesuit tradition, invites applications for a tenure-track position, at the Assistant or Associate level, or a visiting position starting in August 2008. A Ph.D. in accounting from an AACSB-accredited program is required. ABDs will be considered if completion of the dissertation is anticipated by the starting date. All areas of teaching will be considered. Please direct a letter of application, *vita*, and three letters of reference to: Dr. Sandra Richtermeyer, Chair, Department of Accountancy, 611 Schott Hall, Xavier University, Cincinnati, OH 45207; Email: richtermeyer@xavier.edu. A review of applications will begin Friday, August 14, 2007. Xavier University is an Equal Opportunity/Affirmative Action Employer that seeks a broad spectrum of candidates including women and minorities.

555 UNIVERSITY OF MISSISSIPPI, School of Accountancy seeks to fill three tenure-track positions at the Assistant, Associate, or Full Professor level beginning the fall semester 2008. Interest in teaching and research in the areas of auditing, systems, and governmental accounting are preferred, but all areas will be considered. Applications must be submitted at https://jobs.olemiss.edu (paper applications cannot be accepted). Applications must include (1) a letter that details your qualifications and stating what you would seek to achieve as a member of the Ole Miss faculty, (2) a current *vitae*, and (3) the names and contact information of three references. Review of applicants will begin immediately and continue until the position is filled. For further information contact: Dr. Rick Elam, Reynolds Professor of Accountancy, Patterson School of Accountancy, The University of Mississippi, University, MS 38677-1848; Phone: 662-915-5281; Email: relam@olemiss.edu. The University of Mississippi is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA employer.

556 FLORIDA STATE UNIVERSITY, Department of Accounting, invites applications for a tenure-track position to teach either tax or financial accounting starting January or August 2008. Rank is open. Applicants for the rank of Assistant Professor should have or be near completion of a Ph.D. and show promise for publications in quality, scholarly journals. Applicants for ranks above Assistant should have a Ph.D. and both an established scholarly publication record (consistent with rank) and promise for future scholarly publications in quality journals. Expectations include excellence in research, teaching, and service. Appointees at ranks above Assistant should expect to work closely with Ph.D. students. Applicants should send their *vita* to: Bud Fennema, The College of Business, Florida State University, PO Box 3061110, Tallahassee, FL 32306-1110; Email: bfennema@cob.fsu.edu.

557 GEORGETOWN UNIVERSITY, McDonough School of Business invites applications are invited for tenure-track positions in the areas of Financial and Managerial Accounting starting Fall 2008. Ph.D. in accounting required; rank open. Candidates must demonstrate a strong commitment to excellence in both teaching and research. Georgetown University, an institution of a national and international focus, is located close to the nation's government and the international organizations that have roots in Washington. It attracts faculty and students from all parts of the nation and the world. The McDonough School of Business offers B.S.B.A., an M.B.A. and an I.E.M.B.A. degrees. Applications should be sent to: Accounting Faculty Recruiting, Office of the Deputy Dean, The McDonough School of Business, Georgetown University, 37th and O Streets, NW Room 206, Old North Washington, D.C. 20057; Email: MSBFacultyRecruiting@msb.edu. Georgetown University is an Equal Opportunity/Affirmative Action Employer.

558 UNIVERSITY OF IDAHO, Department of Accounting seeks applicants for a visiting Professor of managerial accounting beginning January 2008 for one semester. Salary depends on qualifications and experience. Ph.D. in accounting is required. ABDs will be considered. Applicants should apply online at: http://www.hr.uidaho.edu (job seekers) or send applications, including a complete resume, graduate studies transcript(s), teaching evaluations and letters from three professional references to: Marla Kraut, Department of Accounting, University of Idaho, PO Box 443161, Moscow, ID 83844-3161; Phone: (208) 885-6453. Screening will begin July 9, 2007. AA/EOE.

559 FORDHAM UNIVERSITY, Schools of Business invite applicants for faculty tenure-line positions at all ranks in Accounting and Taxation starting Fall 2008. Candidates must have earned a doctorate in Accounting or Taxation by August 2008 and have a strong commitment to research and teaching. We are interested in strong expertise in one or more of the following areas: financial accounting, international accounting, managerial accounting, taxation and auditing. Candidates for Associate Professor must have a record of success in research and teaching. Candidates for Full Professor are expected to have achieved a national reputation for excellence in research, as reflected by a record of publications in top-tier academic journals, and evidence of highly effective teaching. Applications should include a *curriculum vitae*, three letters of reference, and an example of scholarly work, sent to: Professor Allen Schiff, Accounting Area Chair, Fordham University, 113 West 60th Street, New York, NY 10023; Email: Schiff@fordham.edu; Fax: (212) 765-5573. Fordham is an independent, Catholic university in the Jesuit tradition that welcomes applications from men and women of all backgrounds. Fordham University is an Affirmative Action/Equal Opportunity employer. Fordham Business Schools are accredited by the AACSB.

560 FORDHAM UNIVERSITY, Schools of Business at Fordham University invite applicants for our Clinical Staff position in Taxation and Accounting starting Fall 2008. We are specifically looking for expertise in one or more of the following areas: Financial Accounting, International Accounting, Auditing, Taxes. Clinical faculty are expected to have a strong professional background with recent experience in the profession. The successful candidate will be a strong and motivated teacher, an energetic and well informed professional, and a person expected to actively participate in the life of the Schools. To be eligible for a clinical appointment, a candidate must have received a Ph.D. in Taxation or an M.B.A., J.D., or L.L.M. degree. Applications should include a *curriculum vitae*, three letters of reference, and an example of scholarly work, sent to: Professor Allen Schiff, Accounting Area Chair, Fordham University, 113 West 60th Street, New York, NY 10023; Email: Schiff@fordham.edu; Fax: (212) 765-5573. Fordham is an independent, Catholic university in the Jesuit tradition that welcomes applications from men and women of all backgrounds. Fordham University is an Affirmative Action/Equal Opportunity employer. Fordham Business Schools are accredited by the AACSB.

561 UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, Department of Accountancy is recruiting faculty for full-time appointments at all ranks. Candidates at advanced ranks must possess a doctoral degree, and candidates for Assistant Professor positions must possess or be near completion of a doctoral degree. Applicants for senior positions should have a strong research record and the ability to participate in doctoral education and curriculum development at the undergraduate and graduate levels. In addition, non-tenure-track Lecturer and Visiting positions are available. Applicants should submit a resume that lists research publications and courses taught. Compensation is competitive and will be commensurate with the appointment level and applicant's record. To ensure full consideration, applications must be received by November 1, 2007. Applications received thereafter may be considered if there are positions still available. Proposed starting date is May 16, 2008 or as soon as possible thereafter. Electronic submissions preferred. Please send to: accyrecruiting@business.uiuc.edu. Contact: Recruiting Chair, Department of Accountancy, 360 Wohlers Hall, College of Business, University of Illinois, 1206 S. Sixth Street, Champaign, IL 61820. The University of Illinois is an Affirmative Action, Equal Opportunity Employer.

562 UNIVERSITY OF ARKANSAS AT LITTLE ROCK invites applications for a tenure-track Assistant and a non-tenure-track Visiting, 2007–2008, and a tenure-track faculty (rank open; subject to funding) for 2008–2009. Must have Ph.D. (Accounting) from an AACSB institution (or completion of all degree requirements before employment commences); ability/willingness to teach live and web courses; and a strong research interest that has led to, or is likely to lead to, academic and professional publications and presentations. Please contact: Dr. Robert R. Oliva, Chairman, Department of Accounting, University of Arkansas at Little Rock, 2801 South University Avenue, RBUS 211, Little Rock, AR 72204; Email: rroliva@ualr.edu. The University of Arkansas at Little Rock is an Equal Opportunity/Affirmative Action Employer and actively seeks the candidacy of minorities, women, and persons with disabilities. Under Arkansas law, applications are subject to disclosure. Persons hired must have proof of legal authority to work in the United States.

563 RHODES COLLEGE, Department of Economics and Business seeks applications and nominations for a newly endowed chair, the Robinson Professor of Accountancy. Candidates should be at either the Full or established Associate Professor level and have strong research and teaching credentials. A Ph.D. in accounting is required and a CPA certification is preferred. In addition, an interest in and willingness to interact with the business community is necessary. Teaching duties include introductory courses as well as a combination of graduate accounting courses to be determined by the interests of the individual. Research support will be provided. Review of completed applications will begin on October 1, 2007. Applicants should send a letter of application, a *curriculum vita*, three letters of reference, and a statement of teaching philosophy. More information is available at: http://www.rhodes.edu/public/5_0-Administration/5_2-Human_Resources/5_2_1-Work_At_Rhodes/5_2_1_1_9-faculty.asp. Contact: Deborah N. Pittman, Chair of the Department of Economics and Business at: pittman@rhodes.edu.

565 KANSAS STATE UNIVERSITY, Department of Accounting, invites applications for a tenure-track position at the Assistant or Associate level beginning August 2008. All areas will be considered, but the greatest need is in tax, audit, or financial accounting. Professional experience and certification are desirable. Commitment to excellence in teaching (both undergraduate and graduate) and scholarship is required. A Ph.D. in accounting or Ph.D. in a related area with experience in accounting is required. A Ph.D. from an AACSB-accredited institution or similarly accredited international institution is required. ABD near completion will be considered. Screening begins September 15, 2007 and will continue until the position is filled. Send a letter of application, *curriculum vitae*, a list of three references, a one-page description of teaching philosophy, recent teaching evaluations, and evidence of scholarship to: Dr. Stacy Kovar, Search Committee Chair, Department of Accounting, Calvin Hall 109, Kansas State University, Manhattan, KS 66506-0502; Phone: (785-532-6083); Email: skovar@ksu.edu. Kansas State University is an Equal Opportunity Employer and actively seeks diversity among its employees.

566 UNIVERSITY OF WESTERN ONTARIO, Richard Ivey School of Business seeks candidates for a tenured Associate Professor or Professor position in Accounting, or for a Probationary (tenure-track) or Limited-Term Assistant or Associate Professor starting July 2008. The successful candidate will be committed to the practice of accounting and/or management in both research and teaching, and willing to teach introductory financial and/or management accounting, advanced financial reporting/statement analysis, and in executive development programs. Applicants should have fluent written and oral communication skills in English. Submission deadline: October 31, 2007. Apply at: www.ivey.uwo.ca/faculty/Career_Opps.htm. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority. The Richard Ivey School of Business and The University of Western Ontario are committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, aboriginal people, and persons with disabilities.

567 ARIZONA STATE UNIVERSITY, School of Global Management and Leadership is recruiting for a tenure-eligible position at the Assistant or Associate level to teach courses in AIS beginning August 2008. We offer state-of-the-art facilities, teaching loads for research active faculty of four courses per academic year, summer research grants, and other forms of professional support. The SGML offers a Master's in Accounting and Applied Leadership and a Bachelor's in Accountancy as well as a Master's in Applied Leadership and Management and B.S. in Leadership in International Management and B.S. in Global Business. For Required and Desired qualifications, deadline, and application process, please see our website at: http://www.west.asu.edu/sgml/jobs_opportunities. For more information, please visit our website at: http://www.west.asu.edu/sgml. Pre-employment screening, including a criminal history check, of the finalist is required under Arizona Board of Regents policy. ASU is an AA/EO Employer in policy and practice.

568 UNIVERSITY OF VIRGINIA, Accounting Area at the McIntire School of Commerce is seeking applications for one or more full-time tenure-track positions beginning August 2008. The strongest candidates will have expertise in contemporary research practices and topics, as well as demonstrated excellence in teaching financial, managerial, or tax accounting at both the graduate and undergraduate levels. The position(s) is/are open to all ranks. Candidates must have an established record of both strong research and teaching. Review of applications will begin soon and continue until the position is filled. Applicants will need to send a letter of interest and *curriculum vitae* to: faculty.apps@comm.virginia.edu; or to: Faculty Recruiting, Attn: Heather Cullop, University of Virginia, PO Box 400173, Charlottesville, VA 22904-4173. Mail applications will be processed, but email submissions are highly preferred. The University of Virginia is an Equal Opportunity/Affirmative Action employer. Information about the McIntire School can be found at: http://www.commerce.virginia.edu.

569 TOWSON UNIVERSITY invites applications for a Chair, Department of Accounting. The College of Business and Economics is an AACSB-accredited institution and accounting program with over 2,900 undergraduate business students, 450 accounting majors, and 50 graduate accounting students. Applicants should possess a Ph.D./D.B.A. with a concentration in accounting from an AACSB-accredited university, and be qualified for appointment at the Associate or Full Professor level. Experience with AACSB accreditation is highly desirable. This is a 12-month administrative appointment with a reduced teaching load, beginning July 2008. Salary is competitive. Review of applications will begin 9/30/07. Please submit application, *curriculum vitae*, teaching evaluations, and names of three references to: Andrew D. Schiff, Ph.D., CPA, Chair Search Committee, Department of Accounting, Towson University, Stephens Hall 102, 8000 York Road, Towson, MD 21252-0001; Email: aschiff@towson.edu. Towson University is an Equal Opportunity/Affirmative Action Employer. Women, minorities, persons with disabilities, and veterans are encouraged to apply.

570 UNIVERSITY OF ARKANSAS, Department of Accounting in the Sam M. Walton College of Business invites applications for the Ralph L. McQueen Endowed Chair in Accounting beginning August 2008. Candidates for the McQueen Chair must possess a Ph.D. in accounting, have an active research agenda with a strong record of scholarly research and a strong commitment to excellence in graduate and undergraduate teaching. Interested candidates should send (1) current *vitae*; (2) evidence of teaching effectiveness; (3) copies of research working papers; and, (4) letters of reference or the name, address, telephone number, and email address of at least three references to: Vernon Richardson, Department of Accounting, WCOB 401, Sam M. Walton College of Business, One University of Arkansas, Fayetteville, Arkansas 72701. The University of Arkansas is An Equal Opportunity/Affirmative Action institution. Women and minorities are encouraged to apply.

571 UNIVERSITY OF ARKANSAS, Department of Accounting in the Sam M. Walton College of Business invites applications for an Assistant Professor (tenure-track) position beginning August 2008. The Department of Accounting will consider all teaching interests with preference for financial, tax and managerial. Candidates for Assistant Professor should have a Ph.D. in accounting, outstanding research potential, and a strong commitment to excellence in graduate and undergraduate teaching. Interested candidates should send (1) current *vitae*; (2) evidence of teaching effectiveness; (3) copies of research working papers; and, (4) letters of reference or the name, address, telephone number, and email address of at least three references to: Vernon Richardson, Department of Accounting, WCOB 401, Sam M. Walton College of Business, One University of Arkansas, Fayetteville, Arkansas 72701. The University of Arkansas is an Equal Opportunity/Affirmative Action institution. Women and minorities are encouraged to apply.

572 IOWA STATE UNIVERSITY, Department of Accounting invites applications for a tenure-track appointment to begin Fall 2008. Applications for Assistant, Associate, or Professor will be considered in all areas of accounting. Auditing and AIS are preferred. Applicants should possess the commitment and ability to be productive scholars and excellent teachers. Minimum requirements include an earned doctorate in accounting or a closely related field prior to beginning the appointment. An established research program and a history of successful teaching experiences will be expected at the Associate or Professor levels. The review of applications will begin on October 31, 2007 and will continue until the position is filled. Please submit a current *curriculum vitae*, a working paper, and contact information for three references to: Dr. Marvin Bouillon, Chair, Iowa State University, Department of Accounting, 2330 Gerdin Business Building, Ames, Iowa 50011-1350; Email: bouillon@iastate.edu. ISU is an EO/AA Employer.

573 GRAND VALLEY STATE UNIVERSITY, Department of Accounting and Taxation, Seidman College of Business invites applications for a new position beginning Fall 2008. Position is open to rank and area of specialization, subject to funding approval. Applicants should have a doctoral degree in accounting (to be received by August 2008), a strong commitment to teaching excellence and scholarly research. The Department and College are both AACSB-accredited. Salary is competitive. To apply, email or mail (1) *cv* that includes educational achievements, publication record, and teaching experience; (2) student evaluations and/or other evidence of teaching effectiveness; (3) example of research; and (4) three references to: dunnc@gvsu.edu; or to: Dr. Cheryl Dunn, Accounting Faculty Search Committee Chair, Department of Accounting and Taxation, Grand Valley State University, 401 West Fulton Street, Grand Rapids, MI 49504. Review of applications will begin immediately and continue until the position is filled. Grand Valley State University is an EO/AA Institution.

574 WESTERN KENTUCKY UNIVERSITY invites applications for Chair of the Department of Accounting, beginning in August 2008. Candidates should possess a Ph.D./D.B.A. in Accounting from an AACSB-accredited school and have a record of scholarship, teaching excellence, and service appropriate for appointment at the rank of Associate Professor or Professor. Professional certification is also desirable. Specialization in auditing or tax is desirable, but not necessary. The position requires effective communication, administrative, organizational, and leadership skills. Knowledge of and experience with AACSB accreditation standards is desirable. Applicants should submit a letter of application, *vitae*, transcripts, and three reference to: Accounting Search Committee, Ford College of Business, Grise Hall 501, 1906 College Heights Boulevard, Bowling Green, KY 42101-1061; Phone: (270) 745-3895; Fax: (270) 745-5953. To ensure full consideration, all materials must be submitted by October 31, 2007. The position will remain open until filled. WKU is an Affirmative Action/Equal Opportunity Employer.

575 WESTERN KENTUCKY UNIVERSITY, Department of Accounting invites applications for the James R. Meany Professor of Accounting, beginning in August 2008. Candidates should possess a Ph.D./D.B.A. in Accounting from an AACSB-accredited school. Professional certification is desirable. Specialization in auditing or tax is desirable, but not necessary. Applicants should have a record of effective teaching and a distinguished and ongoing record of research. Endowed Professors are expected to provide leadership in the area of scholarly activity and assume a significant role in achieving the mission of the department. The professorship includes a salary stipend and an annual expense allowance. Rank and teaching load are subject to the applicant's qualifications. Applicants should submit a letter of application, *vitae*, transcripts, and three reference to: Accounting Search Committee, Ford College of Business, Grise Hall 501, 1906 College Heights Boulevard, Bowling Green, KY 42101-1061; Phone: (270) 745-3895; Fax: (270) 745-5953. To ensure full consideration, all materials must be submitted by October 31, 2007. The position will remain open until filled. WKU is an Affirmative Action/Equal Opportunity Employer.

576 WESTERN KENTUCKY UNIVERSITY, Department of Accounting invites applications for a tenure-track position, beginning in August 2008. Candidates should possess a Ph.D./D.B.A. (or short-term ABD status) in Accounting from an AACSB-accredited school. Professional certification is desirable. Specialization in auditing or tax is desirable, but not necessary. Experienced applicants should have a proven record of quality teaching and research. New doctorates or ABDs should have potential for quality teaching and research. Applicants should submit a letter of application, *vitae*, transcripts, and three reference to: Accounting Search Committee, Ford College of Business, Grise Hall 501, 1906 College Heights Boulevard, Bowling Green, KY 42101-1061; Phone: (270) 745-3895; Fax: (270) 745-5953. To ensure full consideration, all materials must be submitted by October 31, 2007. The position will remain open until filled. WKU is an Affirmative Action/Equal Opportunity Employer.

577 GEORGIA INSTITUTE OF TECHNOLOGY, College of Management, is seeking candidates for a faculty position starting August 2008. Advanced Assistant or Associate Professor candidates are preferred. A Ph.D. in Accounting or related discipline is required. The College offers academic programs leading to Bachelor's, M.B.A., and Ph.D. degrees. Please visit http://mgt.gatech.edu. Please send the following to recruit-accounting@mgt.gatech.edu by January 15, 2008: cover letter; *vita*; up to three research papers with your name in the filename (e.g., "Smith, John – Research Paper 1.pdf"); three letters of recommendation with your name in the filename (e.g., "Smith, John – Letter of Recommendation 1.pdf"). Packages sent by mail will not be accepted. All documents must be in Microsoft Word or Adobe PDF format. A part of the recruiting process involves capturing statistical information on our applicants. Participation is strictly voluntary. Please complete the form found at: http://mgt.gatech.edu/downloads/ga_tech_disclosure.doc, and email it to vdf_email@mgt.gatech.edu.

578 UNIVERSITY OF VERMONT, AACSB-accredited School of Business Administration invites applications for a tenure-track position in Accounting at the Assistant Professor level beginning Fall 2008. Candidates must hold a doctoral degree from an AACSB-accredited school. ABDs will be considered if completion of the degree is expected prior to the start date. All areas of Accounting will be considered; preference will be given to candidates with prior professional work experience. Candidates should have a strong commitment to excellence in teaching and scholarly research. Salary and benefits are competitive. Applicants should send a letter of application, current *curriculum vitae*, evidence of teaching effectiveness, and the names of three references to: Dr. Susan B. Hughes, School of Business Administration, 55 Colchester Avenue, Burlington, VT 05405-0157; Website: http://www.uvmjobs.com. Email applications are encouraged. Review of applications will begin immediately and continue until the position is filled. Information about the University and the School of Business can be found at: http://www.uvm.edu and http://www.bsad.uvm.edu. The University of Vermont is committed to building a culturally diverse educational environment. The University is an Affirmative Action/Equal Opportunity Employer. Women and minorities are actively encouraged to apply.

579 UTAH VALLEY STATE COLLEGE (Utah Valley University, effective July 1, 2008), Accounting Department has one and possibly two tenure-track openings. The position requires a Ph.D. from an AACSB-accredited business school, but ABDs nearing completion will be considered. Preference will be given to candidates with teaching interests in Auditing, Financial Accounting, and Managerial Accounting. All ranks will be considered. Good teaching and research skills are required. The School of Business is AACSB-accredited and offers undergraduate degrees to 600 accounting majors, with a graduate program under development. UVSC (UVU) is one of the nation's fastest-growing comprehensive four-year institutions with 24,000 students. The campus is located in the beautiful Wasatch Mountains, 45 minutes from downtown Salt Lake City with access to high-quality cultural events and outstanding outdoor activities. Screening of applicants will continue until the position is filled. Position posting can be found at: http://www.uvsc.edu.

580 DARTMOUTH COLLEGE, Tuck School of Business at Dartmouth, Dartmouth College's graduate school of management, anticipates faculty searches in accounting. We are open to all levels of appointment—Assistant, Associate, or Full Professor—and we will be recruiting at the new-Ph.D. level. We are interested in candidates who will produce research of excellent quality that will have high impact on the field. There must be evidence that the candidate can conduct research and teach at a level of quality consistent with Tuck's high standards. Send résumés to: Senior Associate Dean Robert G. Hansen, 100 Tuck Hall, Hanover, NH 03755. Dartmouth College is an Equal Opportunity/Affirmative Action Employer and has a strong commitment to diversity. Women, persons of color, persons with disabilities, and veterans are encouraged to apply.

581 WESTERN WASHINGTON UNIVERSITY invites applications for tenure-track Assistant or Associate Professor positions in financial accounting and/or accounting information systems beginning Fall 2008. Doctoral degree in accounting required by appointment date. Duties include teaching undergraduate and graduate courses, university service, and scholarly publication. View announcement, including complete list of qualifications, at: http://www.acadweb.wwu.edu/hr/Jobs/faculty.asp. Western overlooks Puget Sound, is situated between Seattle and Vancouver, BC, and has 12,000 students. AACSB-accredited. Please send letter of application, *curriculum vitae*, transcripts, evidence of teaching effectiveness, and names of three references to: Professor George Sanders, Search Committee Chair, Department of Accounting, Western Washington University, Bellingham, WA 98225-9071; Phone: (360) 650-3202; Email: ACCTSearch@wwu.edu. Application review will begin 09/17/07. AA/EOE.

582 UNIVERSITY OF IDAHO, Department of Accounting seeks applicants for tenure-track faculty appointment as Assistant or Associate Professor of accounting beginning January or July 2008. Teaching emphasis in managerial accounting. Salary depends on qualifications and experience. Ph.D. or ABD in accounting and demonstrated interest and/or record of teaching, research, and service accomplishments required. Professional certification desired. Applicants should apply online at: http://www.hr.uidaho.edu (job seekers) or send applications including a complete resume, a graduate studies transcript, teaching evaluations, and letters from three professional references to: Dr. Teresa P. Gordon, Department of Accounting, University of Idaho, PO Box 443161, Moscow, ID 83844-3161; Phone: (208) 885-6453. Screening will begin immediately. AA/EOE.

583 NORTH CENTRAL COLLEGE invites applications for a full-time, tenure-track appointment to begin September 1, 2008. The department offers majors and minors in financial and managerial tracks; a five-year integrative program to complete a bachelor and M.B.A. degree is also offered. A master's degree in accounting and the CPA designation required. All applicants need to demonstrate teaching and scholarship interests and ability in financial accounting and advanced coursework, particularly auditing. North Central College, founded in 1861, is a selective, comprehensive liberal arts institution of 2,500 students, located in Naperville, 30 miles west of Chicago (http://www.noctrl.edu). Send a letter of application, *vitae*, teaching philosophy, transcripts, and three letters of recommendation to: Accounting Search Committee, c/o Academic Affairs Office, North Central College, 30 North Brainard Street, Naperville, IL 60540. Review of applications will begin October 22. Applicants who would enrich the diversity of the campus community are encouraged to apply. EOE.

584 STANFORD UNIVERSITY, Graduate School of Business, invites applications for tenured and non-tenured faculty positions in Accounting, effective September 2008, from candidates at all levels and stages of their careers who are interested in financial accounting, managerial accounting, tax, and other areas. Candidates must have a Ph.D. and the highest level of accomplishment or promise in both scholarly research and M.B.A. and Ph.D. teaching. Applications should include *cv* and copies of research publications. Applicants are strongly encouraged to submit applications electronically at: http://www.gsb.stanford.edu/recruiting. Upload *cv*, publications, and teaching evaluations (if applicable) to that site. Alternatively, you may email electronic materials to: Faculty_Recruiter@GSB.Stanford.Edu; or postal mail non-returnable materials to: Faculty Recruiting Manager, Box A, Graduate School of Business, Stanford University, Stanford, CA 94305-5015. Please allow three weeks for processing. Three letters of recommendation should be sent to that same address. The deadline is January 18, 2008. Stanford University is an Equal Opportunity/Affirmative Action Employer.

585 UNIVERSITY OF CALIFORNIA, IRVINE, Paul Merage School of Business is seeking candidates for a tenure-track faculty position in Accounting to begin July 1, 2008. We will consider candidates in all ranks and research areas, although preference may be given to seasoned Assistant Professors or newly tenured Associate Professors in the area of financial reporting, with possible crossovers into taxation or international accounting issues. Doctorate required (entry-level candidates can be near completion). We offer a competitive compensation package. To learn more about UC Irvine and the Paul Merage School of Business, please visit: http://www.merage.uci.edu/. To apply, please log onto UC Irvine's RECRUIT located at: https://recruit.ap.uci.edu/. Applications will be accepted until the position is filled, although first consideration will be given to completed applications received by October 1, 2007. The University of California, Irvine is an Equal Opportunity Employer committed to excellence through diversity.

586 SYDDANSK UNIVERSITY, Department of Business and Economics, Odense, invites applications for a vacant Assistant Professorship in accounting, to be filled as soon as possible. The position is limited to a period of three years. The position is with the department's Accounting and Auditing group. The field of research in the group is accounting in its widest sense, including financial accounting, management accounting and auditing. The Assistant Professorship carries teaching obligations and research responsibility in the field of accounting and/or auditing. The department teaches accounting and auditing to M.S.c in Business Administration and Auditing, B.S.c and M.S.c in Business Administration, B.S.c in Business Administration and Commercial Law, Diploma in Business Administration, M.B.A., M.P.M., and the journalism program. Applications cannot be based on the present notice, which is an excerpt of the full job advertisement, available at: http://www.sdu.dk/vacancies. Position No. 341/526-075426 Closing date: December 3, 2007 at 12:00.

587 SYDDANSK UNIVERSITY, Department of Business and Economics, University of Southern Denmark, invites applications for a tenured Full Professorship in Accounting. The Full Professorship is a permanent position that carries teaching obligations and research responsibility in the field of Accounting. As such, the Professor is also expected to contribute actively to the development of the department's research and teaching environment, to take on teaching and duties as supervisor at Bachelor's, Master's, and Ph.D. levels, as well as administrative tasks. Applicants must document strong and original research achievements at an international level, and must have experience in supervision of Ph.D. students. You cannot apply for the position based on this advertisement. You can see the full advertisement on the university's homepage: http://www.jobs.sdu.dk/index.php?vis=eng. Position No.: 341/526-075419 Closing date: December 3, 2007 at 12:00.

588 UNIVERSITY OF KARLSRUHE invites applications for a Professorship in "Controlling and Strategic Planning" (W3) at the School of Economics and Business Engineering at the University of Karlsruhe (TH). As the position requires basic proficiency in the German language, the position is advertised in German. The full text can be found at: http://www.zvw.uni-karlsruhe.de/7168.php. Applications should be sent until October 12, 2007 to: Dean of the School of Economics and Business Engineering, University of Karlsruhe (TH), D-76128, Karlsruhe.

589 PH.D. IN ACCOUNTING looking for a visiting position in the Northeast or Mid-Atlantic regions for Fall 2007 and Spring 2008. Single-semester appointments considered. I am AACSB academically qualified with an active research agenda and four peer-reviewed publications in the last two years. Experienced in teaching Intro, Intermediate, and Advanced Financial as well as Intro Managerial, Cost, and Financial Statement Analysis. I have served on doctoral dissertation committees and supervised graduated students. Great teaching evaluations and references available upon request. Please email me at: wdbcny@yahoo.com; or call (315) 256-7189.

590 SONOMA STATE UNIVERSITY invites applications for three tenure-track accounting positions at the Assistant or Associate Professor level for Fall 2008. Applicants must have demonstrated potential for competencies in teaching, research, and service. Appointment may be made at the rank of lecturer for candidates who are ABD and are anticipating completion of the doctorate no later than December 19, 2008. Preference will be given to those candidates with experience in teaching auditing or advanced accounting, but candidates in all fields of accounting will be considered. Professional experience is highly desirable. SSU is part of the California State University System and is located 48 miles north of San Francisco. Review of applications will begin for those applications received by November 1, 2007 and, if position is not filled, will continue until it is filled. For a complete position announcement, please consult: http://www.sonoma.edu/aa/fa. SSU is an Equal Opportunity/Affirmative Action Employer.

591 BARUCH COLLEGE, Stan Ross Department of Accountancy invites applications for anticipated openings for tenure-track and visiting positions at all ranks. Areas of specialization include financial and managerial accounting, taxation, auditing (internal and external), and information systems. Rank depends on qualifications and salaries are competitive. Candidates should have a doctoral degree in Accountancy or be close to the completion of that degree. For ranks above Assistant Professor, candidates should have a completed Ph.D. degree, a record of excellent scholarly research, and demonstrated teaching effectiveness. Please submit *curriculum vitae*, a research paper, and letters of reference by February 15, 2008 to: Professor Donal Byard, Stan Ross Department of Accountancy, One Bernard Baruch Way, New York, NY 10010. Baruch College is an AA/EO/IRCA/ADA employer.

592 ALPHION CORPORATION, a technology company with a bright future, is seeking a team player for their Controller position. Proven experience in dealing with management/leadership in a business environment and good knowledge of financial control including core skills in accounting, financial modeling, and analysis. Thorough knowledge of general accounting principles, financial analysis techniques, balance sheets and income statement accounting, budgeting techniques, and reporting procedures. Position Highlights: Prepare financial reports that summarize and forecast business activity of the organization including reports that analyze income, expenses, and earnings; Manage cash activities, including investment of available funds; Assist in the preparation of tax returns; Minimum Bachelor's Degree in Accounting or Business Administration; Certified Public Accountant (CPA) required with at least five years experience working in Finance or Accounting. Send your resume and salary requirements to: careers@alphion.com

593 DUKE UNIVERSITY, Fuqua School of Business at Duke University is seeking to fill tenure-track faculty positions in accounting for the 2008/2009 academic year. Candidates should have a Ph.D., academic experience, and a strong research record. Hiring decisions will be based on the candidate's ability to contribute to the research and teaching missions of the Fuqua School of Business. Materials from doctoral students should be received by January 15, 2008; others should send their materials as soon as possible. Interested individuals should complete the electronic application at: http://faculty.fuqua.duke.edu/areas/accounting/accounting_recruiting.html. Duke University is an Equal Opportunity/Affirmative Action Employer. The Fuqua School of Business is committed to fostering a diverse educational environment and encourages applications from members of groups under-represented in academia.

594 UNIVERSITY OF NOTRE DAME, Department of Accountancy, invites applications for position openings at the Assistant and Associate Professor levels. All research areas will be considered. Applicants for Assistant Professor positions should expect to complete doctoral degree requirements before the start of the contract period. All candidates should have a strong commitment to scholarly research and excellence in teaching. Salary is very competitive and research support is excellent. Please send *curriculum vita* and an example of scholarly work to: Professor H. Fred Mittelstaedt, Chair, Department of Accountancy, Room 102, Mendoza College of Business, University of Notre Dame, Notre Dame, IN 46556. The University of Notre Dame is an Equal Opportunity/Affirmative Action Employer.

595 UNIVERSITY OF UTAH, School of Accounting and Information Systems invites applications for new tenure-track faculty positions in Accounting at all ranks in any area of specialization beginning Fall 2008; pending funding and University approval. Applicants should possess a doctorate or be close to completion. We offer competitive salaries, research support, teaching loads, and excellent fringe benefits. The School of AIS and the David Eccles School of Business are accredited by the AACSB. Send application by January 15, 2008, including dissertation proposal or working paper, *vita*, and three letters of reference to: Robert Allen, Director, School of AIS, 1645 E Campus Center Dr., Room 108, University of Utah, Salt Lake City, UT 84112. Late applications accepted until position is filled. The University of Utah is an Equal Opportunity/ Affirmative Action employer, encourages applications from women and minorities, and provides reasonable accommodation to the known disabilities of applicants/employees.

596 NAVAL POSTGRADUATE SCHOOL (NPS), The Graduate School of Business & Public Policy (GSBPP) seeks experienced individual for a position in Accounting. Applicants should currently hold Associate or Full Professor rank, possess a sustained record of scholarship, evidence a strong commitment to M.B.A.-level teaching, and possess potential for faculty leadership. Experience and background to teach advanced courses in management control systems, financial reporting, or strategic cost management desirable. U.S. citizenship required for award of tenure. NPS is located in Monterey, California, south of San Francisco. GSBPP is a research-oriented institution with 60+ full-time faculty and 500+ graduate students. AACSB- and NASPAA-accredited. Emailed applications preferred. Please send covering letter, current resume, and three references to: busapp@nps.edu, Attn: Douglas Moses, Senior Associate Dean, GSBPP. Applicants should submit evidence of teaching abilities and scholarship. Attachments accepted in PDF or MS Word only. More info: http://www.nps.navy.mil/gsbpp/. NPS is an Equal Opportunity Employer.

597 CALIFORNIA STATE UNIVERISTY, LONG BEACH invites applicants for a tenure-track accounting faculty position, Assistant/Associate Professor for Fall, 2008. Applicants must hold a Ph.D. or a DBA degree with a major in Accounting and have demonstrated potential for excellence in teaching, research, curriculum development and service contributions. Professional certification is desirable. Compensation will be competitive and be commensurate with the candidate's qualifications and experience. Applicant screening will begin November 5, 2007 and will continue until the position is filled. Please send a letter of application and *curriculum vitae* to: Dr. Steven A. Fisher, Chair, Department of Accountancy, California State University, Long Beach, 1250 Bellflower Boulevard, Long Beach, CA 90840-8504, sfisher@csulb.edu. CSULB is an urban university in the California State University System. It is located near the ocean in the City of Long Beach. CSULB is an Affirmative Action/Equal Opportunity Employer and has a strong commitment to the principle of diversity.

Rady | UC San Diego
School of Management

The Rady School of Management (**www.rady.ucsd.edu**) at the University of California, San Diego (UCSD) invites applications for assistant, associate and full professor positions in accounting. Preference will be given to experienced applicants who have distinguished scholarly records, have demonstrated teaching expertise with graduate students and executives, have demonstrated leadership efforts and/or contributions to diversity, and are good institution builders. All applicants must have a Ph.D. or will be working towards a Ph.D. by the start date of the new academic year. Associate-level candidates must show evidence of a strong research record in their specialization, while candidates for senior rank must demonstrate a continuing publication record in leading journals. Salary and appointment level are dependent on experience and based on University of California pay scales. The positions are expected to have a start date of July 1, 2008. A detailed vita (PDF or Word document form) will be accepted only by email to **radyaccounting@ucsd.edu**. Please indicate reference **job code: ARACCT** on the subject line and state the level of position you are applying for in your cover letter. Review will begin October 1, 2007 and will continue until positions are filled. UCSD is an Affirmative Action/ Equal Opportunity Employer with a strong institutional commitment to the achievement of excellence through diversity among its faculty and staff.

Clara R. Toppan Distinguished Professor of Accounting

The Department of Accounting at the University of Wyoming is pleased to announce the establishment of the Clara R. Toppan Distinguished Professor of Accounting. Clara was the first woman CPA in the state of Wyoming and a dear friend of the department. We are seeking applicants for this position with a teaching background in financial accounting. Qualifications for this position include a record of teaching and scholarship appropriate for the rank of full professor and a willingness to work with faculty, students, and the accounting profession in the state and region. The person holding this professorship will engage in scholarship, teaching, and outreach; however, the exact job description will be adapted to the individual strengths and desires of the candidate.

A salary of $145,000 is available for a nine-month contract plus the University of Wyoming's excellent benefits package. A half-time graduate assistant will be provided, along with travel funds, and moving expenses. Qualified candidates should mail a letter of application, three letters of reference, curriculum vitae, and summaries of teaching performance to Penne Ainsworth, Chair; Department of Accounting; Dept. 3275, 1000 East University Ave.; Laramie, WY 82071 or via e-mail to penne@uwyo.edu. The University is an AA/EEO employer. Screening will begin October 31, 2007 and continue until the position is filled.

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University of Detroit Mercy
College of Business Administration
Tenure-Track Faculty Position in Accounting

UNIVERSITY OF DETROIT MERCY, College of Business Administration, seeks candidates for a tenure-track accounting faculty position at the Assistant or Associate Professor level. The College places a major emphasis on excellence in teaching. Publication and other participation in scholarly activity are expected. Candidates will possess a doctorate in accounting or be within six months of degree completion at the time of appointment. We seek faculty who view teaching and scholarship as closely related and complementary pursuits. UDM is a Carnegie classification Master's C&U I and is an independent Catholic institution of higher education with a culturally diverse faculty and student body. Applicants should send a letter of interest, resume, names and contact information for three references, and evidence of accomplishment in teaching and scholarship, to Dean Hossein Nivi at the College of Business Administration, University of Detroit Mercy, 4001 W. McNichols Rd., Detroit, MI 48221-3038. Phone: 313-993-1204. **http://udmercy.edu, http://business.udmercy.edu.**

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17. Signature and Title of Editor, Publisher, Business Manager, or Owner
Director of Finance and Administration
Date
September 14, 2007

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

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2. In cases where the stockholder or security holder is a trustee, include in items 10 and 11 the name of the person or corporation for whom the trustee is acting. Also include the names and addresses of individuals who are stockholders who own or hold 1 percent or more of the total amount of bonds, mortgages, or other securities of the publishing corporation. In item 11, if none, check the box. Use blank sheets if more space is required.
3. Be sure to furnish all circulation information called for in item 15. Free circulation must be shown in items 15d, e, and f.
4. ~~Item 15h., Copies not Distributed, must include (1) newsstand copies originally stated on Form 3541, and returned to the publisher,~~ (2) estimated returns from news agents, and (3), copies for office use, leftovers, spoiled, and all other copies not distributed.
5. If the publication had Periodicals authorization as a general or requester publication, this Statement of Ownership, Management, and Circulation must be published; it must be printed in any issue in October or, if the publication is not published during October, the first issue printed after October.
6. In item 16, indicate the date of the issue in which this Statement of Ownership will be published.
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